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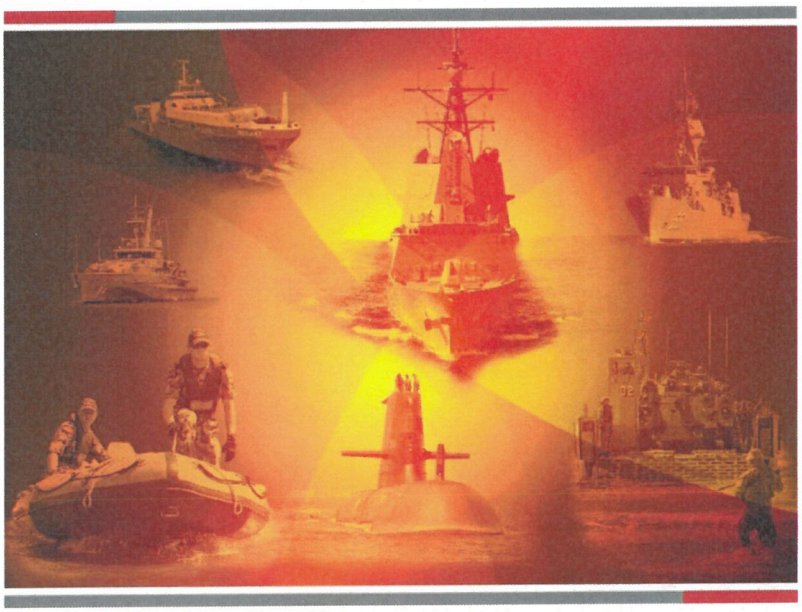
AUSTRALIAN NAVAL CLASSIFICATION AUTHORITY MANUAL (VOLUME 2)

DIVISION 3: SHIP RULES

CHAPTER 04: ENGINEERING SYSTEMS

PART 2: SOLUTIONS TO THE ANC RULES



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ANCA Manual (Volume 2)

Division 3: Ship Rules, Chapter 04: Engineering Systems, Part 2: Solutions to the ANC Rules

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AUSTRALIAN NAVAL CLASSIFICATION RULES

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AMENDMENTS

Proposals for amendments to the ANCA Manual (Volume 2) may be sent to:

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May 2024	1.0	First issued	April 2025

Division 3: Ship Rules
Part 2: Solutions to the ANC Rules

Chapter 04: Engineering Systems

Contents

Solutions to the ANC Rules

Rule 0. Goal

0.1 Goal for this Chapter is contained in Part 1.

Rule 1. General

1.1 The Naval Vessel Operator (NVO) shall present and justify solution for demonstrating compliance to Part 1 of the Australian Naval Classification (ANC) Rules. All decisions that affect compliance with the requirements of this chapter shall be recorded at all stages, from concept to disposal, and these records shall be maintained throughout the life of the Naval Vessel.

Solutions

1.2 The rulesets of a single Classification Society shall be used for designing, constructing and maintaining the engineering systems of Naval Vessels.

1.3 The Classification Society issuing the ruleset required by paragraph 1.2 shall be recognised as a Competent Organisation by the Australian Naval Classification Authority (ANCA).

1.4 The requirements prescribed in Part 1 shall be met through the application of the appropriate class notations of the ship's Classification Society, supplemented by additional standards, or justified solutions where necessary to meet the Operating and Support Intent (OSI).

1.5 If requirements in this Chapter contradict the requirements in the ruleset of the Classification Society or defined regulations and standards, requirements in this Chapter take precedence or consult the ANCA.

1.6 All Rules, Regulations, Codes and Standards used shall be the latest versions as amended at the time of drafting the ANC Basis unless a specific version date is specified in the text.

Rule 2. Not Used

Rule 3. Provision of Operational Information

3.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

3.2 Maintenance and inspection procedures shall be established to ensure operational efficiency of engineering equipment.

3.3 Procedures shall include arrangements for regular inspections and routine tests by the Naval Vessel's crew and relevant third parties to maintain continuous reliable operation and meet the following requirements:

3.3.1 SOLAS Chapter II-1, Regulation 26 – *General* for operating and maintenance instructions and engineering drawings for ship machinery and equipment

3.3.2 DEF(AUST)5629C – *Production of Military Technical Manuals*

3.3.3 DEF(AUST)IPS-*5630 Interactive Electronic Technical Publications*

3.3.4 inspection, maintenance, thorough examination, operational testing, overhaul and repair procedures shall be according to the maintenance manuals and associated technical documentation developed by the original equipment manufacturer or their authorised representative and be available onboard

3.3.5 procedures shall ensure that embarked persons carrying out maintenance, thorough examination, operational testing, overhaul and repair are authorised, suitably qualified and experienced

3.3.6 clearly defined precautions, limitations, and equipment requirements for the safe operation of engineering systems shall be provided to the operators.

Rule 4. Propulsion

4.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

4.2 In addition to the requirements in this Rule, propulsion systems shall meet the structural, mechanical and electrical rules of the Classification Society.

4.3 Propulsion machinery systems shall meet the requirements of SOLAS Chapter II-1, Regulation 26 – *General*.

4.4 Machinery arrangements shall meet the requirements of SOLAS Chapter II-1, Regulation 27 – *Machinery*.

Note: Where this Chapter references an IMO Convention, any Unified Interpretations adopted by the IMO in relation to that Convention shall also apply.

Note: See Rule 26 *Fuel and Lube Oil Systems* of this Chapter for requirements relating to fuel and lubrication oil system.

Note: See Rule 16 *Machinery Controls* of this Chapter for requirements relating to machinery control.

Rule 5. Manoeuvring Equipment

5.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

5.2 In addition to the requirements in this Rule, manoeuvring equipment shall be meet the structural, mechanical and electrical rules of the Classification Society.

5.3 Manoeuvring equipment and auxiliary machinery essential to the manoeuvring and safety of the Naval Vessel shall meet the following requirements:

5.3.1 SOLAS Chapter II-1, Regulation 26.6 or as otherwise specified in the OSI

5.3.2 SOLAS Chapter II-1, Regulation 28 – *Means of Going Astern*

5.3.3 SOLAS Chapter II-1, Regulation 29 – *Steering Gear* and Regulation 30 – *Additional Requirements for Electric and Electrohydraulic Steering Gear*

5.3.4 SOLAS Chapter II-1, Regulation 37 – *Communication between navigating bridge and machinery space*

5.3.5 be provided with emergency electrical power or alternative source of main electrical power to ensure continuity of service in accordance with the requirements of Rule 13 *Electrical Distribution and Equipment*.

Rule 6. Pressure and Piping Systems

6.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

6.2 In addition to the requirements in this Rule, pressure and piping systems shall meet the structural, mechanical and electrical rules of the Classification Society.

6.3 Gaskets within pipe flange connections shall be suitable type, configuration and construction for the transported fluid under the design pressure and temperature conditions and meet the following requirements:

6.3.1 ISO 15837 *Ships and marine technology — Gasketed mechanical couplings for use in piping systems — Performance specification*

6.3.2 ISO 15838 *Ships and marine technology — Fittings for use with gasketed mechanical couplings used in piping applications — Performance specification.*

6.4 Piping for the lubricating and hydraulic oil systems shall be designed and constructed such that the sampling can be conducted in accordance with ISO 28523 *Ships and marine technology — Lubricating and hydraulic oil systems — Guidance for sampling to determine cleanliness and particle contamination.*

6.5 Piping systems shall be marked in accordance with ISO 14726 *Ships and marine technology — Identification colours for the content of piping systems*.

Rule 7. Ship Stabilising Systems

7.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

7.2 In addition to the requirements in this Rule, ship stabilising systems shall meet the structural, mechanical and electrical rules of the Classification Society.

7.3 Where defined by the OSI, the Naval Vessel shall be provided with stabilising system to reduce the rolling motion and meet the scope and nature of those operations.

7.4 Stabiliser arrangements, equipment and fittings shall be designed not to place embarked persons at unnecessary risk of hazards and to ensure the risks associated with the following are eliminated or minimised:

7.4.1 electrical

7.4.2 hazardous material or liquids

7.4.3 moving parts

7.4.4 slips, trips or falls

7.4.5 manual handling

7.4.6 swinging or unrestrained loads

7.4.7 concurrent operational activities

7.4.8 deployment and embarkation of survival and rescue craft.

Rule 8. Not Used

Rule 9. Other Essential Safety Functions

9.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

9.2 In addition to the requirements in this Rule, other essential safety functions shall meet the structural, mechanical and electrical rules of the Classification Society.

9.3 Machinery space and location of emergency systems or installations shall meet the following requirements:

9.3.1 SOLAS Chapter II-1, Regulation 12 – *Peak and Machinery Space Bulkheads, Shaft Tunnels, etc.*

9.3.2 SOLAS Chapter II-1, Regulation 39 – *Location of Emergency Installations in Passenger Ships.*

Rule 10. Electrical Generation and Power Supplies

10.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

10.2 In addition to the requirements in this Rule, electrical generation and power supplies shall the structural, mechanical and electrical rules of the Classification Society.

10.3 Ship's main source of electrical power shall meet the following requirements:

10.3.1 SOLAS Chapter II-1, Regulation 40/1 - *General*, essential for sustaining the Naval Vessel's operation under the operational and environmental conditions specified in the OSI, without recourse to the emergency electrical supply

10.3.2 SOLAS Chapter II-1, Regulation 41/1 & 41/5 – *Main Source of Electrical Power and Lighting Systems.*

10.4 An emergency source of power shall be provided that meets the following requirements:

10.4.1 for Type A and Type B ships, SOLAS Chapter II-1, Regulation 42/1-3 & 6 – *Emergency Source of Electrical Power in Passenger Ships*

10.4.2 for Type C ships, SOLAS Chapter II-1, Regulation 43/1-3 & 6 – *Emergency Source of Electrical Power in Cargo Ships*

10.4.3 where the OSI requires uninterrupted power supply to essential safety systems, transitional power supply shall be installed in accordance with International Association of Classification Societies (IACS) Unified Requirements (UR) E21 – *Requirements for uninterruptible power system (UPS) units as alternative and/or transitional power*

10.4.4 where OSI requires additional supply periods to essential safety systems and mission critical functions further to the requirements prescribed within 10.4.1 or 10.4.2, those periods of electrical supply shall be specified.

10.5 The emergency generating set starting arrangement shall meet the requirements of SOLAS Chapter II-1, Regulation 44 – *Starting Arrangements for Emergency Generating Sets*.

10.6 The transitional source of electrical power supplying mission critical functions shall meet the duration requirements specified in the OSI.

10.7 Where a main generator is used in lieu of the emergency generator, the requirements of the emergency source of power within Rule 10.4 shall be applied to the main source of power to the satisfaction of ANCA, supplemented by the following:

10.7.1 the number and arrangement of the main generator shall allow for the maintenance of any one generator without affecting the ability to supply emergency source of electrical power

10.7.2 there is at least one source of electrical power of capacity to supply the services required by Rule 10.4 in at least two non-contiguous compartments

10.7.3 the starting arrangement of the main generator used in lieu of the emergency generator shall meet the requirements of SOLAS Chapter II-1, Regulation 44 – *Starting Arrangements for Emergency Generating Sets*.

10.8 Where the OSI requires ship shore connection systems, the design and installation of the Naval Vessel electrical power interface shall meet the following requirements:

10.8.1 for high voltage shore connection above 1000V and up to and including 15kV, IEC/IEEE 80005-1 *High voltage shore connection (HVSC) systems — General requirements*

10.8.2 for low voltage shore connection up to 1000V, IEC/PAS 80005-3 *Low Voltage Shore Connection (LVSC) Systems — General requirements.*

Note: The above IEC standards describe HVSC and LVSC systems, onboard the ship and on shore, to supply the ship with electrical power from shore.

Additional and/or alternative interface arrangements onboard the ship may be required depending on shore supply or distribution system of the administrations or the authorities responsible for that system within whose jurisdiction the Naval Vessel intended to operate.

Rule 11. Not Used

Rule 12. Not Used

Rule 13. Electrical Distribution and Equipment

13.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

13.2 In addition to the requirements in this Rule, electrical distribution and equipment shall meet the structural, mechanical and electrical rules of the Classification Society.

13.3 The ship's electrical distribution system, which supports essential safety functions and, where specified by the OSI, mission critical functions shall be protected against power loss to ensure continuous electrical power availability in accordance with SOLAS Chapter II-1, Regulation 40 – *General* and 41 – *Main Source of Electrical Power and Lighting Systems*.

13.4 The main source of electrical power shall meet the requirements of SOLAS Chapter II-1, Regulation 53 – *Special requirements for machinery, boiler and electrical installations*.

13.5 The automatic transfer to the emergency electrical power source in the event of main power failure shall meet the following requirements:

13.5.1 for Type A and Type B ships in accordance with SOLAS Chapter II-1, Regulation 42/3 – *Emergency source of electrical power in passenger ships*

13.5.2 for Type C ships in accordance with SOLAS Chapter II-1, Regulation 43/3 – *Emergency source of electrical power in Cargo ships*

13.5.3 where specified by the OSI, the continuity of supply for Mission Critical Functions and Essential Safety Functions shall be in accordance with IACS UR E21 – *Requirements for uninterruptible power system (UPS) units as alternative and/or transitional power.*

13.6 Where specified by the OSI, the 400 Hz electrical distribution system shall provide electrical power that meets the requirements of MIL-STD-1399 Section 300, Part 1 *Low Voltage Electrical Power, Alternating Current.*

Note: See Chapter 11 *Aviation Systems* Rule 10 *Aviation Services* and Chapter 13 *Combat System* for requirements relating to the 400Hz electrical power characteristics and demand.

13.7 The electrical distribution system for hotel services, domestic appliances or personal electrical and electronic equipment shall meet the following requirements:

13.7.1 AS/NZS 60038 – *IEC standard voltages*

13.7.2 AS/NZS 3000 – *Electrical installations (known as the Australian/New Zealand Wiring Rules)*

13.7.3 AS/NZS 3112 – *Plugs and socket-outlets*

13.7.4 galvanically isolated from the ship's main electrical power system.

13.8 **Designation and Markings on Electrical Equipment**. All electrical equipment shall be allocated with a unique equipment designator. If an electrical equipment was to be removed, the unique equipment designator shall not be reassigned to another equipment.

13.9 **Cabling.** All electrical cables shall be of fire resistant, low smoke and zero halogen type and meet the following requirements:

13.9.1 IEC 60092-350 *Electrical installations in ships – Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications*

13.9.2 IEC 60331 *Tests for electric cables under fire conditions - Circuit integrity* for cables servicing essential safety and mission critical functions

13.9.3 IEC 60332 *Tests on electric and optical fibre cables under fire conditions* main electric and optical fibre cables

13.9.4 IEC 60754 *Test on gases evolved during combustion of materials from cables* for determination of the halogen acid gas content

13.9.5 cables, glands, and terminations, shall be clearly marked, labelled and uniquely identifiable at appropriate locations along their length and at each termination point

13.9.6 cable identification shall follow a unified wiring scheme that meets the requirements of AS/NZS 3000 – *Electrical installations (known as the Australian/New Zealand Wiring Rules)*

13.9.7 earthing and bonding for equipment and installations not covered under the Naval ship's Classification Society Rules shall comply with MIL-STD-1310 *Shipboard Bonding, Grounding, And Other Techniques For Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, And Safety.*

Rule 14. Lighting

14.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

14.2 In addition to the requirements in this Rule, the lighting system shall meet the structural, mechanical and electrical rules of the Classification Society.

14.3 **Primary Lighting**. The system shall meet the requirements of SOLAS Chapter II-1, Regulation 41/2 - *Main Source of Electrical Power and Lighting Systems*.

Note: For all references in this Rule to Classification Society, where the Classification Society Ruleset document uses the term "*main lighting*", it shall be read to mean "*primary lighting*" as defined in Division 1 Annex A *Definitions and Abbreviations*.

14.4 **Secondary Lighting**. The system shall meet the following requirements:

14.4.1 for Type A and Type B Naval Vessels, the system including Escape, Evacuation and Rescue lighting shall meet the requirements of SOLAS Chapter II-1, Regulation 42/2.1 – *Emergency Source of Electrical Power in Passenger Ships*

14.4.2 roll-on roll-off (RoRo) spaces shall meet the requirements of SOLAS Chapter II-Regulation 42-1 - *Supplementary Emergency Lighting for Ro-Ro Passenger Ships*

14.4.3 for Ship Type C, secondary lighting system including Escape, Evacuation and Rescue lighting shall meet the requirements of SOLAS Chapter II-1, Regulation 43/2.1-2.2 – *Emergency Source of Electrical Power in Cargo Ships*

Note: For all references in this Chapter to SOLAS where the IMO document uses the term "*emergency lighting*", it shall be read to mean "*secondary lighting*" as defined in Division 1 Annex A *Definitions and Abbreviations*.

14.4.4 secondary lighting in cabins shall meet the requirements of SOLAS Chapter II-1, Regulation 41/6 – *Main Source of Electrical Power and Lighting Systems*

14.4.5 secondary lighting with battery supported power supply shall meet the requirements of DEF STAN 02-587 Part 1 *Requirements for Lighting Systems Surface Ships – Contingency Lighting*.

Note: For all references in this Chapter to standard DEF STAN 02-587 Part 1 where the standard uses the term "*contingency lighting*", it shall be read to mean "*secondary lighting*" as defined in Division 1 Annex A *Definitions and Abbreviations*.

14.5 Compartments or areas on the ships where the loss of primary lighting could create a hazard to embarked persons the lighting circuit in those compartments shall be supplied from more than one electrical power circuit, such that in the event of an electrical power failure of one circuit, there is light available.

14.6 **Transitional Lighting**. In the event of loss of primary and secondary lighting, at locations where illumination shall be maintained, transitional lighting shall be provided until the primary or secondary lighting is restored.

14.7 **Illuminances Level**. All lighting systems covered in this Rule shall meet the illuminances level requirements of DEF STAN 02-587 Part 1 *Requirements for Lighting Systems Surface Ships.*

14.8 The arrangement of lighting fittings shall meet the requirements of SOLAS Chapter II-1, Regulation 45/7 – *Precautions against Shock, Fire and Other Hazards of Electrical Origin*, to prevent temperature rise on adjacent surfaces.

14.9 **Safety Lighting**. Where the OSI requires the ship to operate at night, safety lighting shall be provided for the foreseeable operating conditions of the ship:

14.9.1 when the ship is operating in non-darkened ship conditions, arrangement for selected areas shall be provided with safety lighting to avoid bridge duty embarked persons from losing their night vision

14.9.2 safety lighting shall be controllable from a master switch on the bridge.

14.10 **Dark Adaptation Lighting**. Where the OSI requires the ship to operate at night under darkened ship conditions, all equipment, indicator, and instrument that emits light, in areas with a requirement for dark adaptation shall be restricted in intensity and controllable from a master switch on the bridge.

14.11 **Darken Ship Arrangement**. Arrangement shall meet the requirements of DEF STAN 02-587 Part 1 *Requirements for Lighting Systems Surface Ships – Darken Ship Arrangements*, supplemented with the following:

14.11.1 lighting system arrangements shall ensure that no light can be visible directly from outboard during darkened ship conditions

14.11.2 lighting colour used in the Dark Adaptation and Safety Lighting system shall consider the effectiveness of the way-finding system

14.11.3 the switching of normal to reduced or night adaptation lighting shall be controlled from either a master switch on the bridge or by locally sited master switches.

14.12 **Lighting in External Areas**. Permanent white lighting shall be provided to illuminate all open areas on the weatherdeck to facilitate work and movement at night under normal conditions.

14.13 All permanent lighting on the weatherdeck shall be positioned or filtered such that, no light shines directly outboard.

Rule 15. Electrical Protection Arrangements

15.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

15.2 In addition to the requirements in this Rule, electrical protection arrangements shall meet the structural, mechanical and electrical rules of the Classification Society.

15.3 The electrical protection system shall meet the requirements of SOLAS Chapter II-1 Regulation 40 - *General* and IEC 60092 – *Electrical Installations in Ships* including the following:

15.3.1 protection against short circuit and overload

15.3.2 insulation monitoring system with an automatic fault location.

15.4 Precaution for electrical installations against shock, fire and other hazards of electrical origin shall meet the requirements of SOLAS Chapter II-1, Regulation 45 – *Precautions against Shock, Fire and Other Hazards of Electrical Origin.*

15.5 Nonconducting mats or grating shall be provided at the front and rear of the switchboard and meet the requirements of IEC 61111 *Live working – Electrical insulating matting.*

15.6 Switchboards shall be assigned and labelled with their respective category of arc flash hazard in accordance with AS/NZS 4836 *Safe working on or near low-voltage and extra-low voltage electrical installations and equipment* for minimising electrical hazard to provide the Naval Vessel operator the necessary arrangements for protection of embarked persons undertaking operations.

Rule 16. Machinery Control

16.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

16.2 In addition to the requirements in this Rule, machinery control systems shall meet the structural, mechanical and electrical rules of the Classification Society.

16.3 The machinery control systems shall meet the following requirements:

16.3.1 SOLAS Chapter II-1, Regulation 31 – *Machinery Controls*

16.3.2 SOLAS Chapter II-1, Regulation 37 – *Communication between navigation bridge and machinery space*

16.3.3 as specified by the OSI, machinery spaces shall meet the requirements of SOLAS Chapter II-1, Regulation 46 – *General for periodically unattended machinery spaces*

16.3.4 SOLAS Chapter II-1, Regulation 49 – *Control of propulsion machinery from the navigation bridge*

16.3.5 SOLAS Chapter II-1, Regulation 53/4 – *Special Requirements for Machinery, Boiler and Electrical Installations.*

Rule 17. Alerts and Safety Systems

17.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

17.2 In addition to the requirements in this Rule, alert and safety systems shall meet the structural, mechanical and electrical rules of the Classification Society.

17.3 Systems that provide alert and safety functions are considered Essential Safety Functions and shall be provided with electrical power that meets the requirements of Rule *13 Electrical Distribution Systems*.

17.4 **Alert systems** associated with machinery systems shall meet the following requirements:

17.4.1 IMO Resolution A. 1021 (26) – *Code on Alerts and Indicators*

17.4.2 SOLAS Chapter II-1, Regulation 51 – *Alarm System*.

17.5 **Safety Systems**. Shutdown of the propulsion system shall have provision to override its safety system that meets the requirements of SOLAS Chapter II-1, Regulation 52 – *Safety Systems*.

17.6 Provision to override certain safety systems shall be provided to support battle override as specified in the OSI and supported by a risk analysis that meets the requirements of Division 2 *Core Design Rules* Chapter 01 *General Requirements* Rule 3 *System Safety*.

Rule 18. Systems Integration

18.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

18.2 In addition to the requirements in this Rule, systems integration shall meet the structural, mechanical and electrical rules of the Classification Society.

Note: See Division 2 *Core Design Rules* Chapter 01 *General Requirements* Rule 4 *Systems Architecture* for requirements relating to systems integration and systems architecture.

Rule 19. Heating, Ventilation and Air Conditioning

19.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

19.2 In addition to the requirements in this Rule, Heating, Ventilation and Air Conditioning (HVAC) system shall meet the structural, mechanical and electrical rules of the Classification Society.

19.3 Environmental conditions specified in the OSI shall be used to design and construct the HVAC system.

19.4 HVAC servicing machinery and auxiliary machinery spaces shall meet the requirements of ISO 8861 *Shipbuilding – Engine-room ventilation in diesel-engined ships – Design requirements and basis of calculations*.

19.5 HVAC system for all other spaces shall meet the requirements of ISO 7547 *Ships and marine technology Air-conditioning and ventilation of accommodation spaces and other enclosed compartments on board ships – Design conditions and basis of calculations for living and working spaces*, supplemented by the following:

19.5.1 ISO 9943 *Shipbuilding — Ventilation and air-treatment of galleys and pantries with cooking appliances*

19.5.2 the atmosphere in hazardous areas shall be maintained at a lower pressure than non-hazardous adjoining spaces

19.5.3 shall not form a source of ignition where there is the potential for a build-up of flammable or explosive gaseous mixtures

19.6 Air filters shall be fitted to air inlets of cooling units and meet the requirements of ISO 16890 *Air filters for general ventilation*.

19.7 The supply ducts to machinery and control rooms containing sensitive electrical equipment, including gyrocompass, navigational, combat systems and computer data systems shall be fitted with high efficiency particulate air (HEPA) filters and meet the requirements of ISO 29463 *High efficiency filters and filter media for removing particles in air.*

19.8 Exposed deckheads and ship's sides which are above the waterline at light ship conditions, and internal bulkheads dividing different temperature zones, shall be insulated with suitable

impact resistant marine grade material with an (R) rating of at least 1.35 $m^2°C/W$ tested and complying with Chapter 06 *Fire Safety* Rule 4 *Fire Growth Potential*.

Rule 20. Tanks

20.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

20.2 In addition to the requirements in this Rule, Naval Vessel's tanks including the filling, venting, overflow and sounding arrangements shall meet the rules of the Classification Society.

20.3 The tank arrangements for bulk fluids, required for machinery systems shall meet the requirements of SOLAS Chapter II-2, Regulation 4 – *Probability of Ignition*.

20.4 See Rule 25 *Fresh Water Systems* of this Chapter for the requirements relating to Fresh Water tanks.

20.5 See Rule 30 *Wastewater and Oily Water Transfer Systems* of this Chapter for the requirements relating to Wastewater and Oily Water Transfer Systems tanks.

20.6 The internal structure of waste oil tanks shall be designed and constructed to allow free drainage of contents to the lowest part of the tank and prevent the build-up of waste matter within the tank.

20.7 Location and arrangement of vent pipes for fuel oil service, settling and lubrication oil tanks shall be such that in the event of a broken vent pipe not directly lead to the risk of ingress of seawater splashes or rainwater.

20.8 Vents from tanks containing flammable liquids shall be fitted with anti-flash devices.

20.9 Vents from tanks shall not be cross connected where their contents are not homogenous.

Note: See Chapter 02 *Structure* Rule 6 *Preservation Systems* for the requirements relating to Ballast Water Tanks.

Rule 21. Not Used

Rule 22. Not Used

Rule 23. Refrigeration Systems

23.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

23.2 In addition to the requirements in this Rule, refrigeration systems shall meet the structural, mechanical and electrical rules of the Classification Society.

23.3 The Naval Vessel shall be provided with refrigeration systems to meet the scope and nature of operations as specified in the OSI.

23.4 Refrigeration systems shall be designed, constructed and installed to meet the requirements of ISO 5149 *Refrigerating systems and heat pumps — Safety and environmental requirements*, supplemented by the following:

23.4.1 power supplies shall comply with meet the requirements of Rule 10 *Electrical Generation and Power Supplies* and Rule 13 *Electrical Distribution and Equipment*

23.4.2 ventilation shall meet the requirements of Rule 19 *Heating Ventilation and Air Conditioning*

23.4.3 temperature monitoring devices shall be provided outside cold and cool rooms, other permanently manned compartments and all refrigerated equipment.

23.5 Refrigeration systems, including chilled water systems that support or provide service to essential safety functions or essential capability functions shall meet the following:

23.5.1 be located within different damage control areas

23.5.2 be designed and installed to ensure that, in the event of a failure in any part of the system, independent redundancy is provided to maintain the required environment for the equipment and machinery, achieved by duplication of the equipment, or alternative methods as approved by the ANCA

23.5.3 failure of a chilled water system shall initiate a visual and audible alarm at the control station monitoring spaces and/or equipment which the system support

23.5.4 refrigeration compressors for chilled water systems shall be provided with instrumentation indicating cooling water outlet temperature.

Rule 24. Sea Water Systems

24.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

24.2 In addition to the requirements in this Rule, sea water systems shall meet the structural, mechanical and electrical rules of the Classification Society.

24.3 Seawater discharges shall be positioned where they do not intervene with vessel operations, including but not limited to the following:

24.3.1 pilot transfer arrangements

24.3.2 launching and embarkation of lifesaving appliances

24.3.3 diving deployment and recovery access points.

24.4 A shore connection shall be provided on the port and starboard sides of the ship in a weather deck position to enable the attachment of shore hoses to the connection.

24.5 Flooding bonnets shall be provided and stowed on board to maintain sea water to the sea inlets of High-Pressure Sea Water (HPSW) pumps of electrical generating sets and of air conditioning machinery during dry docking.

24.6 The sea water inlets shall be arranged to accommodate the flooding bonnets.

Rule 25. Fresh Water Systems

25.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

25.2 In addition to the requirements in this Rule, fresh water systems shall meet the structural, mechanical and electrical rules of the Classification Society.

25.3 Potable water system shall be designed and constructed to meet the requirements of ISO 15748-1 *Ships and marine technology - Potable water supply on ships and marine structures*, supplemented by the following:

25.3.1 products that come into contact with water as it passes within potable water systems shall meet the requirements of AS/NZS 4020.1 *Testing of products for use in contact with drinking water*

25.3.2 materials used for fresh and potable water piping and fittings shall meet the requirements of AS/NZS 3688 *Water supply and gas systems - Metallic fittings and end connectors*

25.3.3 heated water systems serving sanitary facilities shall be fitted with temperature regulating devices in accordance with Chapter 12 *Habitability* Rule 6 *Hygiene*

25.3.4 storage capacities of fresh water required on-board shall be according to Division 2 *Core Design Rules* Chapter 01 *General Requirements* Rule 13 *Range and Endurance*.

Note: Management practices of drinking water systems for water quality are described in the *Australian Drinking Water Guidelines.*

25.4 The storage and distribution systems for potable water and technical water shall be separate to each other.

25.5 Cross connections between fresh water systems and other systems are not permitted.

25.6 A minimum of two fresh water storage tanks shall be provided for each fresh water system, each having independent means of supplying the fresh water to the main distribution systems.

25.7 Pipes other than piping containing fresh water of the same quality as the tank contents are not to pass through or be located within a fresh water tank.

25.8 Pipes carrying fresh water are not to pass through tanks other than fresh water tanks of the same quality.

25.9 Visual and audible low and high liquid level alarms shall be installed in each fresh water tank which shall be actuated when the water level reaches a predetermined level.

25.10 A minimum of two fresh water filling connections, allowing connection from either port or starboard shall be provided on the external deck to allow supply from shore based facilities.

25.11 The potable water system shall be designed to allow water samples to be collected from the following points for routine testing:

25.11.1 before treatment

25.11.2 immediately after treatment.

Rule 26. Fuel and Lube Oil Systems

26.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

26.2 In addition to the requirements in this Rule, fuel and lube oil systems shall meet be the structural, mechanical and electrical rules of the Classification Society.

Rule 27. Hydraulic Systems

27.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

27.2 In addition to the requirements in this Rule, hydraulic systems shall meet the structural, mechanical and electrical rules of the Classification Society.

27.3 Hydraulic starting systems used for emergency generating sets shall meet the requirements of Rule 10 *Electrical Generation and Power Supplies.*

Rule 28. Compressed Air Systems

28.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

28.2 In addition to the requirements in this Rule, high pressure and low pressure compressed air systems shall meet the structural, mechanical and electrical rules of the Classification Society.

28.3 The Naval Vessel shall be provided with compressed air systems designed to meet the operational scope and nature as defined in the OSI, including requirements for the quantity and composition of the supplied air.

28.4 The design, construction and certification of compressed air systems, pressure vessels and air receivers shall meet the following requirements:

28.4.1 SOLAS Chapter II-1, Regulation 34 – *Air Pressure Systems*

28.4.2 AS/NZS 1210 *Pressure Vessels* or an equivalent national or international standard

28.4.3 AS/NZS 1715 *Selection, use and maintenance of respiratory protective equipment* requirements for the purpose of providing air for human consumption other than diving and underwater breathing.

28.5 The means for breathing air recharging shall meet the requirement of SOLAS Chap II-2 Regulation 10 – *Fire Fighting* 10.2.6, supplemented by the following:

28.5.1 for application of SOLAS 10.2.6.1, breathing air compressors supplied from the main and emergency switchboard, or independently driven shall have a minimum capacity of 320 litres/minute per required breathing apparatus, not to exceed 420 litres/minute

28.5.2 capable of charging to a nominal pressure of 300 bar

28.5.3 meet the requirements of Rule 13 *Electrical Distribution and Equipment.*

28.6 Air received through the shore connection shall be routed to onboard services only via a non-return valve at the deck connection, and pass through filtration equipment to meet the air quality requirements specified in 28.4.3.

Rule 29. Compressed Gas Systems

29.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

29.2 In addition to the requirements in this Rule, compressed gas systems shall meet the structural, mechanical and electrical rules of the Classification Society.

29.3 The design, construction and certification of compressed gas systems shall meet the following requirements:

29.3.1 SOLAS Chapter II-1 Regulation 32 - *Steam Boilers and Boiler Feed Systems*

29.3.2 AS/NZS 1228 – *Pressure equipment - Boilers* or equivalent national or international standard

29.3.3 AS/NZS 2030.1 – *General requirements* for Cylinders for compressed gases other than acetylene

29.3.4 AS/NZS 2030.2 – *Cylinders for dissolved acetylene.*

29.4 Assigned locations and stowage areas on the Naval Vessel for compressed gas storage, including gas cylinders and pressure vessels, shall meet the safety requirements relevant to the specific compressed gas being stored.

Rule 30. Wastewater and Oily Bilge Water Transfer Systems

30.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

30.2 In addition to the requirements in this Rule, wastewater and oily bilge water transfer systems shall meet the structural, mechanical and electrical rules of the Classification Society.

30.3 Wastewater and oily bilge water transfer systems alarms shall meet the requirements of Rule 17 *Alerts and Safety Systems*.

30.4 Wastewater and oily bilge water transfer systems shall be designed to meet the requirements of ISO 15749 *Ships and Marine Technology - Drainage Systems on Ships and Marine Structures*, supplemented by the following:

30.4.1 MSC/Circ.648 - *Guidelines for the Operation, Inspection and Maintenance of Ship Sewage System.*

Rule 31. Integrated Control System

31.1 The NVO shall present and justify a solution for demonstrating compliance to Part 1 of the ANC Rules. In the presentation and justification of a solution, the following shall be considered.

Solutions

31.2 In addition to the requirements in this Rule, Integrated Control System (ICS) shall meet the structural, mechanical and electrical rules of the Classification Society.

31.3 The ICS shall employ common communication protocols as specified by the OSI, to transfer data between distributed programmable electronic equipment, enabling integration of the ICS with the Naval Vessel's systems.

31.4 The ICS shall meet the following requirements:

31.4.1 SOLAS Chapter II-1, Regulation 31 – *Machinery Controls*

31.4.2 SOLAS Chapter II-1, Regulation 49 – *Control of propulsion machinery from the navigation bridge*

31.4.3 MSC/Circ.891 *Guidelines for the On-Board Use and Application of Computers*

31.4.4 ISO 24060 *Ships and marine technology - Ship software logging system for operational technology*, supplemented by the following:

31.4.4.1 the ICS shall provide a data storage for backup and recording of historical data

31.4.4.2 the onboard data storage shall have the facility to offload archived data as required, to a shore data warehouse facility.

31.4.5 IEC 60092-504 *Electrical installations in ships - Part 504: Automation, control and instrumentation*

31.4.6 IEC 62439-3 *Industrial communication networks - High availability automation networks - Part 3: Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy (HSR).*

Note: Guidelines for condition monitoring and diagnostics of machines are described in ISO 17359 *Condition monitoring and diagnostics of machines — General guidelines* and ISO 13379-1 *Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques.*

31.5 The ICS shall employ IACS Unified Requirements on Cyber Resilience as per the following:

31.5.1 IACS UR E26 – *Cyber Resilience of Ships*

31.5.2 IACS UR E27 – *Cyber Resilience of On-Board Systems and Equipment.*