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AUSTRALIAN NAVAL CLASSIFICATION AUTHORITY MANUAL (VOLUME 2)

DIVISION 3: SHIP RULES

CHAPTER 11: AVIATION SYSTEMS

PART 2: SOLUTIONS TO THE ANC RULES

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

CN Dagg, CSC
Assistant Secretary
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Division 3: Ship Rules
Part 2: Solutions to the ANC Rules

Chapter 11: Aviation Systems

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Solutions to the ANC Rules

Rule 0. Goal

0.1 Goal for this Chapter is contained in Part 1.

Rule 1. System Capability

Solutions

1.1 The Naval Vessel Operator (NVO) shall present and justify a solution for demonstrating compliance to Part 1 of the 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.

1.2 The rulesets of a single Classification Society shall be used for designing, constructing, and maintaining the Aviation 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 ANC Authority.

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, requirements in this Chapter take precedence or consult the ANC Authority

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.

1.7 Verification that the ship complies with this Chapter shall be by the ANC Authority, and for Ship Aviation Facilities (SAF) certification, by the Defence Aviation Safety Authority (DASA). Provision of evidence to support verification shall be by the Naval Vessel Operator (NVO). 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 ship.

Note: Solutions for Multi-Spot Ships are for future development. The ANC Authority and DASA shall be consulted in identifying suitable Multi-Spot Ship Aviation Facilities requirements and standards.

Ship Integration of Air Systems and Aviation Facilities

1.8 Table 1 and 2 shows the required level of air systems and aviation facilities integration into the ship. The integration of aviation systems is defined by the Aviation Level and Class specified in the ship's OSI. It shall be used to determine which functions/systems are applicable to achieve the intended level of aviation operation.

Note: Obstruction Clearances referenced in this Chapter are considered to be the minimum requirements. The designer should seek to maximise the clearances wherever possible to enhance safety and operational capability.

1.9 Shipboard Helicopter Facility Levels and Class Designations shall be in accordance with NATO MPP-02 *Helicopter Operations from Ships Other Than Aircraft Carriers (HOSTAC)* Vol.1 Sect. I *Standards for Ship/Aircraft Interoperability*.

Table 1 – Index to Aviation Integration Requirements

Certification Items		Level I				Level II				Level III			
		Class				Class				Class			
Category	**Item**	**1, 2, 3**	**4, 5**	**6**	**7**	**1, 2, 3**	**4, 5**	**6**	**7**	**1, 2, 3**	**4, 5**	**6**	**7**
Obstruction Clearances	Aviation Capable Ships [8.2] [DASDRM Sect.6 Ch.4]	X				X				X			
	VERTREP Obstruction Clearance Criteria [DASDRM Sect.6 Ch.4]		X				X				X		
	Transfer Obstruction Clearance Criteria [DASDRM Sect.6 Ch.4]				X				X				X
	HIFR Obstruction Criteria [DASDRM Sect.6 Ch.4]			X				X				X	
Operating Area Markings	Flight Deck [8.3] [DASDRM Sect.6 Ch.4]	X				X				X			
	VERTREP Markings [14.5] [DASDRM Sect.6 Ch.4]		X				X				X		
	Ship Number [8.3]	X	X	X	X	X	X	X	X	X	X	X	X
	HIFR [8.3] [DASDRM Sect.6 Ch.4]			X				X				X	
Flight Deck Nets	[8.29]	X				X				X			
Guard Rails	[14.8]		X	X	X		X	X	X		X	X	X
Deck Configuration	Drainage and Slope [8.17]	X		X		X		X		X		X	
	Strength [8.15]	X				X				X			
	Friction [8.14]	X	X	X		X	X	X		X	X	X	
Deck Tie-down Points	[8.53] [DASDRM Sect.6 Ch.4]	X	X			X	X			X	X		
Earthing Points	[8.41]	X	X	X	X	X	X	X	X	X	X	X	X
Recovery Assist and Securing	[9.2]	Y				Y				Y			
Traversing Systems and Mechanical Handlers (note 2)	[8.36]	X				X				X			
Crash Rescue Equipment	[DASDRM Sect.6 Ch.4]	X	X	X		X	X	X		X	X	X	
Explosive Ordnance Facilities	[11.5]	X				X				X			
Electromagnetic Environmental Effects	[Rule 12]	X	X	X	X	X	X	X	X	X	X	X	X
Firefighting	Aviation Firefighting Capability [Chapter 06 – Fire Safety]	X	X	X	X	X	X	X	X	X	X	X	X
	Portable Extinguishers [Chapter 06 – Fire Safety]	X	X	X	X	X	X	X	X	X	X	X	X
	Flight Deck Design [Rule 8] (Chapter 02 – Structures)	X	X	X	X	X	X	X	X	X	X	X	X
	Situational Awareness [4.1]	X	X	X	X	X	X	X	X	X	X	X	X

Certification Items		Level I				Level II				Level III			
		Class				Class				Class			
	Hangar Fire Detection and Extinguishing [Chapter 06 – Fire Safety]	X				X				X			
	VERTREP Operating Area [Rule 14]		X				X				X		
	Transfer Operating Area [Rule 14]				X				X				X
Navigation / Situational Awareness / Instrument Approach	Navigational Systems for Level I and Level II [9.2] (Chapter 09 – Navigation)	X	X	X	X	X	X	X	X				
RADHAZ	[Rule 12]	X	X	X	X	X	X	X	X	X	X	X	X
Ship Borne Sensors	Wind Speed and Direction [9.2]	X	X	X	X	X	X	X	X	X	X	X	X
	Ship Motion Parameters [9.2]	X	X	X	X	X	X	X	X	X	X	X	X
	Course and Speed Displays [9.2]	X	X	X	X	X	O	O	O	X			
	QNH [9.2]	X	X	X	X	X				X			
	Outside Air Temperature [9.2]	X	X	X	X	X				X			
Aviation Control Positions	Station Configuration [11.2]	X	X	X	X	X	X	X	X	X	X	X	X
	Aviation Station Equipment [11.2]	Requisite stations determined by *Station Configuration*. Specifications of equipment at various stations detailed below.											
	Lighting controls for flight deck and associated aviation lights [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X				
	Controls for the deck status display [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	O	O	O
	Deck-status display status [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	O	O	O
	Controls and displays for the emergency wave-off [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	O	O	O
	A means of displaying SHOL [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	O	O	O
	A means of determining ship course and speeds that will place relative wind within SHOL [DASDRM Sect.6 Ch.4]	X	O	O	O	X	O	O	O	X	O	O	O
	CCTV Camera Control [4.1]	X	O	O	O	X	O	O	O	X	O	O	O
	Helicopter Control Station Field of View [11.2]	Required for applicable stations. Applicable stations are not directly dependent on Level or Class, but they are dependent on Station Configuration.											
	Landing Safety Officer Station Field of View [11.2]												

Certification Items		Level I				Level II				Level III			
		Class				Class				Class			
	General Requirements for Stations on Weather Decks [11.2]												
	Helicopter Control Radar Display												
	Closed Circuit Television System [4.1] [DASDRM Sect.6 Ch.4]	X	O	O	O	X	O	O	O	X	O	O	O
	CCTV Video Recording [4.1] [DASDRM Sect.6 Ch.4]	X	O	O	O	X	O	O	O	X	O	O	O
	General Display Requirements [11.2]	X	X	X	X	X	X	X	X	X	X	X	X
	General Control Requirements [11.2]	X	X	X	X	X	X	X	X	X	X	X	X
	General Compartment Requirements for Aviation Stations [Rule 11]	X	X	X	X	X	X	X	X	X	X	X	X
	Emergency Fuel Stop [10.10]	Applicable to any fuelling system											
	Crash Alarm [13.2]	X	O	O	O	X	O	O	O	X	O	O	O
	Fixed Foam Firefighting System (AFFF Monitors and/or Sprinklers) Activation [Chapter 06 – Fire Safety]	X	X	X	X	X	X	X	X	X	X	X	X
	Command Request and Approval Systems [2.2.1]	X	X	X	O	X	X	X	O	X	X	X	O
Aviation Station Communication	Aviation Station Comms [2.2.1] [DASDRM Sect.6 Ch.4]	Details which stations require which communications networks											
	UHF System [2.2.1] [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	X	X	X
	Main Broadcast [2.2.1] [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	X	X	X
	Flight Deck Broadcast [2.2.1] [DASDRM Sect.6 Ch.4]	X				X				X			
	Helicopter Net (Intercom) [2.2.1] [DASDRM Sect.6 Ch.4]	X				X				X			
	Flight Deck Team Comms [2.2.1] [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X	X	X	X	X
	Electrically powered internal telephone [2.2.1] [DASDRM Sect.6 Ch.4]	X	X	X	O	X	X	X	O	X	X	X	O
	Sound Powered Phone [2.2.1]	X	X	O	O	X	X	O	O	X	X	O	O
	Telebrief [2.2.2][DASDRM Sect.6 Ch.4]	O				O				O			
	Tactical Data Link [DASDRM Sect.6 Ch.4]	O				O				O			

Certification Items		Level I				Level II				Level III			
		Class				Class				Class			
Other communications	Standby UHF Radio [DASDRM Sect.6 Ch.4]	X				X				X			
	Emergency Standby VHF Radio [DASDRM Sect.6 Ch.4]	X				X				X			
	Distress Monitoring [2.2.1]	X	O	O	O	X	O	O	O	X	O	O	O
	Secure Voice HF [DASDRM Sect.6 Ch.4]	O				O				O			
	Secure Voice UHF [DASDRM Sect.6 Ch.4]	O				O				O			
	Clear HF Radio [DASDRM Sect.6 Ch.4]	O				O				O			
	Ship's Service Telephone [DASDRM Sect.6 Ch.4]	O				O				O			
	SAR DF Equipment [DASDRM Sect.6 Ch.4]	X				X				X			
Lighting	Floodlighting [3.10] [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X				
	Homing Beacon [3.2]	X	X	X	X	X	X	X	X				
	Deck Status Display [3.2]	X	X	X	X	X	X	X	X	X	X	X	X
	Obstruction Lights [3.2]	X	X	X	X	X	X	X	X				
	HIFR Line-up Lights [3.2]			X				X					
	Emergency Wave-Off [3.2]	X	X	X	X	X	X	X	X	X	O	X	O
	NVD Compatibility [3.3, 4.5]	X	X	X	X	X	X	X	X				
	Horizon Reference System [DASDRM Sect.6 Ch.4]	X	O	O	O	X	O	O	O				
	Glide Slope Indicator [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X				
	Night Signalling Aids [DASDRM Sect.6 Ch.4]	X	X	X	X	X	X	X	X				

Legend: X – Essential
O – Recommended
Y – Specified by the OSI

Note: See Table 2 for Hangar and Facilities, Servicing Facilities, Maintenance Facilities and Explosive Ordnance Facilities.

Note: Traversing Systems of Mechanical Handler is not required for Class 3 certification.

Table 2 – Index to Support Facilities Requirements

Certification Items	Certification Categories			
	Class (See Note 1)			
	1	2	2A	3
Servicing Facilities				
Fuelling System 10.5]	X	X	X	
Defueling System [10.10]	X	X		
Freshwater Wash System [10.20]	X	X	X	
Technical Water [10.27]				
Servicing Fluids [10.29]	X	X	X	
Electrical Power DC [10.30]	X	X	X [2]	
Electrical Power AC [10.40]	X	X	X [2]	
Pneumatics [10.42]	X	X	X	
Servicing Equipment Stowage [10.60]	X	X	X	
Hangar and Facilities				
Hangar [7.2]	X	O		
Maintenance Facilities				
Work Area [7.52]	X	O		
Avionics Maintenance Facility [7.57]	X	O		
Battery Maintenance Facility [7.62]	X	O		
Hydraulics Facility [7.63]	X	O		
Survival Equipment Servicing Facility [7.66]	X	O		
NVD Equipment Facilities [7.67]	X	O		
Maintenance Floodlights [3.9, 3.12]	X	O		
Support Facilities				
Office Space [7.66]	X	O		
Aviation Support Compartments [7.73]				
Stowage Facilities				
Flying Clothing Stowage [7.77]	X	O		
Air Stores Space [7.81]	X	O		
Major Components Stowage [7.84	X	O		

Certification Items	Certification Categories			
	Class (See Note 1)			
	1	2	2A	3
Support Equipment [7.88]	X	O		
Explosive Ordnance Stowage Facilities [11.9] (See also Chapter 10 – Dangerous Goods)	X	O		
Legend: X – Essential O – Recommended				

Note: Class 2A servicing facilities may be provided by temporary embarkation of ground support equipment.

Note: Both AC and DC power may not be available as built-in power supplies.

Rule 2. Communication Systems

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

Solutions

2.2 Aviation Capable Ships

2.2.1 Communications for Aviation Capable Ships shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Communication Systems* and Chapter 08 *Safety Communications* Rule 10 *Sea-Air Radiocommunications*, supplemented by the following.

Tactical Communication Networks

2.2.2 Aviation System tactical communication networks shall be provided as defined by the OSI.

2.2.3 Ships fitted with telebrief shall be able to transmit and receive between the following stations:

2.2.3.1 Bridge;

2.2.3.2 Ops Room/AC;

2.2.3.3 HCO;

2.2.3.4 LSO; and

2.2.3.5 Helicopter.

2.2.4 Telebrief endpoints within the ship shall also have access to the following external circuits, as specified in the OSI:

2.2.4.1 Secure Voice HF;

2.2.4.2 Secure Voice UHF;

2.2.4.3 Clear HF; and

2.2.4.4 SATCOM.

2.2.5 The aircraft telebrief cable shall be of a pull-away design, capable of being disconnected automatically from the aircraft without causing damage in the event of an emergency. "

2.2.6 The aircraft telebrief cable connection to the ship shall be located externally on the flight deck.

2.2.7 The aircraft telebrief cable shall not be routed through hatches or doors.

2.2.8 Ships fitted with Tactical Data Link shall be able to transmit and receive between the Ops Room/AC and the Air System.

Note: The requirement for a Telebrief and/or Tactical Data Link is dependent on the air systems and ship's OSI.

2.3 Transfer & VERTREP Capable Ships

2.3.1 Communications for Transfer and VERTREP Capable Ships shall comply with Chapter 08 *Safety Communications* Rule 10 *Sea-Air* Radiocommunications, supplemented by the following.

2.3.2 Communications for Aviation Capable Ships shall be provided as per DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Communication Systems*.

Rule 3. Ship External Lighting

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

Solutions

3.2 External lighting shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Ship External Lighting*, supplemented by the following.

3.3 All ship's external lighting that are active for the purpose of night air operations shall be Night Vision Device (NVD) Compatible, in accordance the Aviation Level as specified in the OSI.

3.4 All ship's external lighting, that cannot be switched off during night air operations or any devices that can be a light source during night air operations shall meet NVD Friendly requirements, in accordance the Aviation Level as specified in the OSI.

3.5 The Aviation Lighting systems shall be powered from main and emergency supplies.

3.6 The Aviation Lighting systems shall be dimmable and controllable at the Bridge and Aviation Stations.

3.7 The Aviation Lighting systems shall enable the operator to adjust the intensity of each lighting system individually.

3.8 The Aviation Lighting systems shall meet the general lighting requirement in Chapter 04 *Engineering Systems* Rule 14 *Lighting*.

Floodlighting

3.9 A minimum of two hangar wash floodlights shall be installed (one port and one starboard) to illuminate the aft face of the hangar or other structure forward of the landing area.

3.10 Deck wash floodlights shall be:

3.10.1 Installed along the port, starboard, and aft edges of the landing area;

3.10.2 Aligned to provide the best possible illumination of the landing area while keeping spill over (illumination beyond the deck edge) to a minimum;

3.10.3 Adjusted height shall not exceed 0.3 m;

3.10.4 Not violate the approach path clearance requirements; and

3.10.5 Fitted with visors on forward aligned floodlights adjusted to preclude illumination of the forward superstructure more than 150 mm above deck level.

3.11 Overhead floodlights shall be fitted to complement the hangar wash and deck wash flood lighting to provide the best possible illumination from above the flight deck.

3.12 Maintenance floodlights shall be installed for the flight deck. If the installation violates the helicopter clearance requirements, they shall be made portable for helicopter operations.

Line-up lights

3.13 Line-up lights shall:

3.13.1 Be installed coincident with all landing line-up lines;

3.13.2 Include the extended line-up lines;

3.13.3 Be uniformly spaced;

3.13.4 Have a minimum of four lights in on each line-up line with a maximum of 4.6 m between each light;

3.13.5 Orientate the light beams along and/or parallel to the line-up line; and

3.13.6 Be located so that the pilot's view of the line-up lights is not obstructed during approach.

Deck edge lights

3.14 Deck edge lights shall:

3.14.1 Be uniformly spaced;

3.14.2 Have a minimum of four lights on each periphery line, with a maximum of 4.6 m between each light; and

3.14.3 Be located so that the pilot's view of the deck edge lights is not obstructed during the approach.

Masthead obstruction light

3.15 A minimum of one red masthead obstruction light shall be mounted on the mast head fitted as high as practicable on the mast to achieve a 360-degree arc.

Note: The masthead obstruction light may be utilised for additional lighting requirement (as an example ASW operation light).

Rule 4. Visual Surveillance

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 Visual surveillance systems shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Closed Circuit TeleVision (CCTV)* system, supplemented by the following.

4.3 The visual surveillance system shall be considered as a Mission Critical Function consumer load and be electrically connected in accordance with Chapter 04 *Engineering Systems* Rule 13 *Electrical Distribution and Equipment*.

4.4 The ship shall provide visual surveillance systems in accordance the aviation class specified in the OSI.

4.5 Installed systems to monitor Air Systems Launch & Recovery Area, comprising shall include the following features:

4.5.1 Be day and night capable;

4.5.2 Have a recording capability;

4.5.3 Be controllable from the required positions;

4.5.4 Include zoom, pan and tilt facilities;

4.5.5 Be connected to an uninterruptible power supply; and

4.5.6 Be NVD Compatible.

4.6 Any visual surveillance systems installed on the upper decks shall not utilise Infrared (IR) illuminators to achieve low ambient light illumination sensitivity.

Rule 5. Firefighting

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

Solutions

5.2 Aviation Capable Ships shall comply with the firefighting requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Fire Protection*, supplemented by the following.

5.3 Aviation capable ships shall comply Chapter 06 *Fire Safety* Rule 16 *Special Requirements for Aircraft Facilities*.

Hangar Fire Detection and Extinguishing

5.4 The number of air systems, size of air systems and expected fuel loads residing within the air systems shall be considered when designing the hangar firefighting systems.

5.5 Fire hose routing through doorways, hatches or scuttles shall not be permitted.

Firefighting at VERTREP Operating Area

5.6 VERTREP Operating Area. Where the VERTREP Operating Area is not on a Flight Deck the following shall be provided:

5.6.1 The following Portable firefighting appliances shall be available:

5.6.1.1 CO2. – 2 x 5.5 kg extinguishers, and

5.6.1.2 Pyromet. – L2. 2 x 9 kg extinguishers.

5.6.2 Salt Water Fire Hydrants.

5.6.2.1 The minimum distance between fire hydrants shall be one-half of the maximum width of the VERTREP deck (deck edge to deck edge).

5.6.2.2 The hoses shall be immediately accessible from the area to be protected without requiring passage through doors or hatches.

5.6.3 Foam Outlet Facilities.

5.6.3.1 All points of the VERTREP area shall be covered by the hoses of at least two foam outlets.

5.6.3.2 The minimum distance between fire hydrants shall be one half of the maximum width of the VERTREP deck (deck edge to deck edge).

5.6.3.3 The hoses shall be immediately accessible from the area to be protected without requiring passage through doors or hatches.

5.6.3.4 Foam hoses shall be provided of sufficient length to permit all points of the VERTREP area to be reachable by a single hose.

Firefighting at Transfer Area

5.7 Where the Transfer Operating Area is not on a Flight Deck or VERTREP shall meet the requirements of Chapter 06 *Fire Safety* Rule 16 *Special Requirements for Aircraft Facilities*, including:

5.7.1 At least one Salt Water Fire Hydrant

5.7.2 At least one foam outlet.

Rule 6. Role Equipment and Stowage

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

Solutions

Access and Stowage

Note: Storage, maintenance, and accessibility of role equipment shall be considered of Rule 11 if stored in aviation compartment(s).

6.2 Safe stowages for air system(s) role equipment shall be provided. Where equipment is not stored in aviation compartment(s), the ship shall provide the following:

6.2.1 The storage facility shall have ready access to the hangar such that the transportation of heavy, bulky equipment is possible.

6.2.2 The main access to the storage facility shall have a minimum width according to the equipment being stored on the activities to be conducted.

6.2.3 Doors shall be clear to the deck without sills.

Note: If aviation compartment(s) is used for air system(s) role equipment stowage, the solutions in Rule 11 are applicable.

6.2.4 Special handling equipment shall be provided if required for air system(s) role equipment stowage.

Rule 7. Aviation System Storage Area

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

Solutions

Hangar

7.2 Aviation Capable Ships shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aviation System Storage Area*, supplemented by the following.

7.3 The ship shall provide a hangar for the Aviation Class specified in the OSI.

7.4 The physical characteristics of the hangar deck shall be in accordance with Rule 8 *Flight Deck.*

Hangar Obstruction Clearance

7.5 The hangar shall be of sufficient size to accommodate the air system(s) to support the stowage, servicing, maintenance, free entry and exit of the air system(s).

7.6 When one hangar is to accommodate more than one air system, the entrance traverse cycle shall be accomplished without disturbing adjacent air systems that are stowed and secured in the hangar.

7.7 When the air system, in its tallest configuration, passes through the fully opened hangar door, there shall be a minimum clearance of 300 mm between the air system and the door.

7.8 There shall be at least 500 mm clearance between the air system and the lowest point of the hangar when the air system is parked in the hangar in its tallest configuration.

7.9 There shall be at least 600 mm clearance on each side of the air system as it passes through the hangar door in its widest stowable configuration.

7.10 There shall be at least one metre clearance between the air system when parked and any equipment or spares stowed on the hangar bulkheads.

Maintenance Hoist Facility

7.11 An overhead maintenance hoist facility shall be provided in the hangar which complies with Chapter 05 *Seamanship Systems*, Rule 15 *Lifting and Hoisting Appliances* supplemented by the following.

7.12 The overhead hoist shall be electrically powered with a fore and aft and lateral traversing facility.

7.13 The overhead hoist shall have a minimum safe working capacity of at least 1500 kg and a reach to the hangar deck.

7.14 For ships fitted with a Recovery Assist, Secure and Traverse System (RAST), the hoist shall be able to lift the securing and traversing device clear of its track for maintenance.

7.15 The overhead hoist facility shall have a positive locking arrangement when not in use.

7.16 The fore, aft and athwartships movement of the hoisting facilities shall be positively controlled in such a way to ensure no unintended movement of the carriage during air systems maintenance while at sea.

Hangar Doors

7.17 Aviation Capable Ships shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aviation System Storage Area*, supplemented by the following.

7.18 When closed, the hangar door shall be designed to withstand wind pressure from any direction for all Foreseeable Operating Conditions of the ship.

7.19 The hangar door shall be capable to withstand blast pressure and provide ballistic protection in accordance with Chapter 01 *Integrated Platform Survivability* Rule 09 *Ballistic Protection*, as specified in the OSI.

7.20 In the closed position, the hangar door shall be weather-tight.

7.21 The hangar door shall be opened and closed with an electro-mechanical, hydraulic, or pneumatic actuator.

7.22 The hangar door shall have a manually operated backup system in the event of failure of the primary system.

7.23 The switch to operate the hangar door shall be a ‘dead-man’ type, which ceases to operate when not held down by the operator.

7.24 When operating the switch, the operator shall be able to view the full hangar door opening, including when the air systems are parked within the hangar.

7.25 An audible alarm shall sound while the hangar door is in operation.

Hangar Viewing Port

7.26 The hangar viewing port shall be a minimum diameter of 150 mm.

7.27 The hangar viewing port shall maintain the structural integrity and weather tightness of the surrounding structure.

Hangar Internal Lighting

7.28 The hangar internal lighting shall in accordance with Chapter 04 *Engineering Systems* Rule 14 *Lighting*.

7.29 Hangar internal lighting or any devices that can be a light source during night air operations when the Hangar door is in the open position shall be NVD Friendly, in accordance with the Aviation Level as specified in the OSI.

7.30 Portable white lighting shall be available to provide a local lighting facility at any working area within the hangar with a minimum intensity of 400 lux.

7.31 Hangars which are divided into several fire zone boundaries, shall have separate switching and power supplies for the lighting system in each fire zone.

7.32 Secondary lighting shall be fitted at approximately 3 m intervals round the hangar underneath the servicing shelves and at the same level where no shelves are fitted. The light fittings shall be angled to direct light towards the centre of the hangar.

Hangar Heating, Ventilation and Air Conditioning

7.33 Heating and mechanical ventilation systems shall be in accordance with Chapter 04 *Engineering Systems* Rule 19 *Heating, Ventilation and Air Conditioning (HVAC),* supplemented by the following.

Note: The hangar is not normally part of the ship's gas-tight citadel.

7.34 The ventilation system shall provide at least ten air changes per hour. .

7.35 Ventilation shall operate continuously whenever an air system is on board.

7.36 The exhaust inlet shall be above a height of 45 cm from the deck.

Hangar Air Systems Securing Fittings

7.37 Hangar air system tie-down fittings shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Helicopter Securing Fittings* (Tie-Down Fittings).

7.38 Bulkhead fittings shall be provided within hangar areas to facilitate suitable lashing patterns for specified aircraft where approved patterns cannot be achieved with deck tie-down fittings.

Maintenance and Support Facilities.

7.39 The ship shall provide maintenance and support facilities for the Aviation Level and Class as specified in the OSI.

Work Area

7.40 The size of the work area and the facilities within it shall be in accordance with the air system's facilities requirements, supplemented by the following.

7.41 The minimum work area shall be 11.5 m^2.

7.42 The work area shall be readily accessible to the hangar and contain all the mechanical, electrical, electronic, pneumatic, hydraulic etc. facilities required to perform routine maintenance of the aviation system.

7.43 The work area shall be equipped with a work bench, vice, storage cabinets, low-pressure air (with oiler, regulator, and hose), electrical power and flameproof locker for storage of paint and other flammable materials.

Note: See Chapter 04 *Engineering Systems* Rule 14 *Lighting* for the requirements relating to work area illumination levels.

Avionics Maintenance Facility

7.44 The size of the avionics maintenance facility shall be in accordance with the aviation facilities requirements for the Air System, supplemented by the following:

7.44.1 A dedicated work bench with suitable protection against electrostatic discharge;

7.44.2 A vice; and

7.44.3 Stowage facilities for maintenance manuals, tools, test equipment, ready-use spares and flammable materials.

Note: Combining the avionics maintenance facility with the ship's electronics workshop may be acceptable.

Note: See Chapter 04 *Engineering Systems* Rule 14 *Lighting* for the requirements relating to illumination levels.

7.45 Electrical power supply services shall be provided in an electrical panel in accordance with OSI.

7.46 The characteristics of electrical AC power shall conform to MIL-STD-704F.

7.47 A portable transformer shall be provided, where maintenance and support equipment is not compatible with the provided power supply services.

Battery Maintenance Facility

Note: Ship and aviation system shall be considered in combinations when ascertaining relevant battery-charging facility requirements.

7.48 A dedicated battery charging/analysing facility for servicing of air systems shall meet the following minimum requirements:

7.48.1 A charger/analyser for use with the air systems;

7.48.2 Switched receptacles located adjacent to charger/analyser that meet the requirements of charger/analyser power requirements;

7.48.3 Stowage for the charger/analyser;

7.48.4 Secure stowage for batteries undergoing servicing;

7.48.5 A deep corrosive resistant sink supplied with fresh water;

7.48.6 Emergency eye wash equipment compliant with AS 4775 *Emergency eyewash and shower equipment*, easily accessible within the maintenance facility;

7.48.7 Stowage space for a minimum of one spare battery for each aviation system assigned;

7.48.8 The battery maintenance facility shall comply with Chapter 04 *Engineering Systems* Rule 10 *Electrical Generation and Power Supplies*; and

7.48.9 Secure stowage for technical manuals.

Hydraulics Facility

7.49 A portable hydraulic power rig shall be provided to service air system's hydraulic systems.

7.50 Stowage for the portable hydraulic power rig shall be provided.

7.51 Electrical power supply shall be provided to support the servicing of the portable hydraulic power rig both on the flight deck and in the hangar.

Note: Electrical power supplies shall meet the requirements in Chapter 04 *Engineering Systems* Rule 10 *Electrical Generation and Power Supplies.*

Survival Equipment Servicing Facility

7.52 Where a survival equipment maintenance facility is required, it shall be air–conditioned and provided with the following equipment and workspace as follows:

7.52.1 Workbench with stowage space for equipment toolboxes, servicing materials, publications and test equipment;

7.52.2 Hanging rack for immersion coveralls and life preservers;

7.52.3 Sewing machine;

7.52.4 Suitable power supplies for servicing equipment and test equipment; and

7.52.5 Sufficient space within the hangar for inflation and servicing of inflatable equipment, e.g. life rafts and flotation bags.

Note: If this cannot be made available as a dedicated space in the hangar, another suitable space can be nominated.

Note: See Chapter 04 *Engineering Systems* Rule 19 *HVAC* for the requirements relating to air conditioning.

NVD Equipment Facilities

7.53 Where required, secure, access controlled NVD equipment facilities shall be provided for the types and quantities of NVD systems required for flight crew and flight deck teams.

7.54 Secure stowages for support and test equipment shall also be provided.

7.55 A suitable compartment with controlled access to conduct NVD system calibration shall be provided for the NVD goggles and test equipment in use for the air systems.

Office Space

7.56 Where required, an aviation department office space shall be provided.

7.57 Office spaces shall meet the requirements in Chapter 12 *Habitability* Rule 10 *Recreation, Group Activity Arrangements and Offices*.

7.58 The office space shall have direct access to the hangar.

Note: It may be a section of the hangar when a dedicated separate compartment cannot be made available).

7.59 The office space shall meet security requirements, in accordance with Division 2 Chapter 01 *General Requirements* Rule 17 *Physical Security*, as appropriate to the classification of the stored information and security-protected assets.

Aviation Support Compartments

7.60 Where required, the ship shall provide dedicated compartments to enable aviation support activities.

7.61 The ship shall provide the following aviation support compartments:

7.61.1 Aviation Briefing Room;

7.61.2 Flight Crew Changing Room; and

7.61.3 Ready Room(s).

7.62 The aviation support compartments shall meet the minimum requirements:

7.62.1 Room locations shall enable efficient interoperation of personnel with the air system, hangar, and ship's control rooms; and

7.62.2 Compartments' size shall be appropriate for the activity to be undertaken in the compartment including stowage of any equipment within the compartment.

7.63 Aviation Support Compartments shall meet the requirements in Chapter 12 *Habitability* Rule 10 *Recreation, Group Activity Arrangements and Offices*.

7.64 The aviation support compartments shall meet security requirements, in accordance with Division 2 Chapter 01 *General Requirements* Rule 17 *Physical Security*, as appropriate to the classification of the stored information and security-protected assets.

Stowage Facilities

7.65 Aviation Capable Ships shall meet the requirements of DASDRM Section *6 Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aviation System Storage Area*, supplemented by the following.

Flying Clothing Stowage

7.66 Access controlled and security compliant flying clothing stowage shall be provided for pilots, flight crew and passengers flight gear and survival equipment for the air systems and foreseeable air operations.

7.67 The flying clothing stowages shall be within the vicinity of the hangar.

7.68 The flying clothing stowages shall meet security requirements, in accordance with Division 2 Chapter 01 *General Requirements* Rule 17 *Physical Security*, as appropriate to the classification of the stored information and security-protected assets.

7.69 The flying clothing stowage area shall provide appropriate environmental control for the stowed equipment, if required, in accordance with the equipment operational / maintenance manual.

Air System Stores

7.70 A dedicated stowage space shall be available to stow air system's support spares and assemblies which are necessary to support the air systems.

Note: The air system's stores may be partially substituted by the ship's main stores.

7.71 All Air System stores stowages shall provide appropriate space and security for all identified stores. The minimum stowage volume provided for air stores shall be agreed by the NVO according to requirements for the designated aircraft and support requirement.

7.72 The stowage space shall be equipped with suitable shelving and cabinets for storage of the air stores.

Major Component Stowage

7.73 Where, dedicated stowages with appropriate securing provisions shall be provided for major components and Ground Support Equipment (GSE) for the air system.

7.74 All GSE stowage facilities and their access to the flight deck and hangar shall be marked and surfaced with non-skid paint in accordance with DASDRM Section *6 Aerodrome Design Requirements* Chapter *4 Defence Shipborne Heliports – Flight Operations Area*.

Rule 8. Flight Deck

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

Solutions

Clearance Criteria

8.2 Aviation Capable Ships including VERTREP, Transfer and HIFR shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Annex A Obstruction Clearances*.

Flight Deck Marking

8.3 Aviation Capable Ships including VERTREP, Transfer and HIFR Flight deck markings shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Flight Operations Area*.

8.4 Flight deck markings for VERTREP, HIFR and Transfer Area shall follow the general convention markings in accordance with MPP-02.

8.5 All flight deck marking paint shall be in accordance with Chapter 02 *Structure* Rule 6 *Preservation Systems*.

Note: The approved flight deck markings must be documented to Directorate of Naval Engineering Aviation Systems Cell to incorporate into the MPP-02.1 *AUS National Procedures for the purpose of cross-deck operations with allied nations to RAN ships*.

8.6 The flight deck should be marked with a white safe access line for guiding the aircraft into and out of the hangar. This line shall be outside the periphery lines.

Recovery Assist, Secure and Traverse System (RAST) Markings

8.7 A 35 mm wide yellow ‘fore/aft position line’ shall be painted on the RAST's Rapid Securing Device (RSD).

8.8 A corresponding mark shall be painted on the flight deck for optimal positioning of the RSD with the RSD probe directly over the centre of the RSD jaws.

8.9 A 35 mm wide yellow ‘RAST straightening line’ shall be marked on the flight deck.

8.10 The straightening line shall be positioned on the starboard side of, and parallel to, the RAST track.

8.11 Laterally, the straightening line shall be located at a distance equating to half the width of the primary aircraft main undercarriage, and perpendicular to the centre of the RAST track.

8.12 The RAST straightening line shall run parallel to the RAST track and starts in line with or aft of the fore-aft position line and extend a minimum of 3 m forward.

8.13 For ships with a RAST system not centred on the lateral line–up line, a 120 mm wide vertical RAST lateral line–up line shall be painted on the forward bulkhead or hangar to indicate the lateral centre point of each RSD.

Flight Deck and Hangar Deck Physical Characteristics

Surface Friction Requirements

8.14 Surface friction of deck coverings on the flight operations area and hangar shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Surface Friction Requirements*.

Deck Strength Criteria

8.15 The flight deck and hangar structure shall withstand landing, parking, traversing and crash loads of the air systems as specified in the OSI. This includes hatches, covers, and elevators etc. when they are part of the aircraft landing, parking, hangar, or traversing areas.

8.16 The structure of the flight deck shall be in accordance with Chapter 02 *Structure* for all air systems, as specified in the OSI, supplemented by the following:

8.16.1 Deformation of the flight deck shall be minimised in accordance with the design criteria; and

8.16.2 Weld seams shall be smooth and even.

Deck Drainage and Slope

8.17 The flight deck shall be designed so that any fluids (e.g., fuel, oil, water, or firefighting materials) on the deck shall drain directly overboard.

8.18 The drainage system serving the flight deck areas shall be capable of removing 2500 litres of liquid in 120 seconds with the ship in normal trim position.

8.19 If the hangar is at the same deck level as the flight deck, the sheer and camber of the flight deck shall be such that drainage is away from the ship's centreline and away from the hangar with the ship in normal trim position.

8.20 Drainage and sealing of deck openings in flight operations areas shall be provided to prevent any pooling of fluids and prevent fuel, water, or foam agent from entering the hangar and adjacent decks or compartments.

8.21 Where a landing assist or traversing system is fitted in channels on the deck, these channels shall be sealed with drainage directly overboard.

Air System Securing Fittings (Tie-Down Fittings)

8.22 Tie down fittings for air systems shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Helicopter Securing Fittings (Tie-Down Fittings)*.

8.23 Tie-down fittings shall be installed throughout the flight deck areas, air systems landing, traversing, lifts and parking/hangar areas.

Flight Deck Access/Egress

8.24 Flight deck access/egress shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aircraft Operating Area Access/Egress*.

8.25 The flight deck access/ egress arrangements shall comply with Chapter 07 *Escape, Evacuation and Rescue*, supplemented by the following.

8.26 All flight deck access routes shall facilitate access for firefighting and emergency rescue crews.

8.27 A clearly visible warning sign and barrier shall be displayed at all accesses to the VERTREP area when it is in use to prevent inadvertent entry to the danger area. The sign shall read; 'VERTREP STATIONS – NO GANGWAY'.

Flight Deck Safety Nets

8.28 Flight deck safety nets shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Flight Deck Safety Nets*, supplemented by the following.

8.29 Exposed boundaries of the flight deck shall have flight deck nets that can be lowered for air operations and act as guardrails in the vertical position when air operations are not taking place.

8.30 In the lowered position, the flight deck nets shall have a minimal horizontal reach of 1.5 m.

8.31 In the raised position, the height of flight deck net shall be at least 1 m from the deck.

8.32 Gaps greater than 100 mm and unprotected corners shall be fitted with 'in-fill' nets.

8.33 There shall not be any structure within the net frame (such as strengthening bars) or below the net that would cause serious injury to a falling person.

8.34 Flight deck nets shall be lockable in the raised and lowered positions without the use of tools.

Note: Flight nets shall be able to be raised and lowered by at most two personnel in accordance with the anthropometric & physical characteristics defined by Division 2 *Core Design Rules* Chapter *01 General Requirements* Rule 8 *Human Factors Engineering.*

8.35 Each net of the flight deck net shall withstand a maximum load of 4450 N as applied to its centre, distributed over an area approximately 0.61 m X 0.61 m square.

Aviation Handling Systems

8.36 Aviation Capable Ships shall provide a system to traverse the aircraft from the flight deck areas to the hangar or parking area(s) that is compatible with the air system(s) for the Aviation Class specified in the OSI.

8.37 The air system's recovery, assist and securing system shall comply with DASDRM Chapter 4 *Defence Shipborne Heliports – Recovery Assist and Securing System*, and be compatible with the air system(s).

8.38 An integrated system should be provided to assist in traversing the aircraft together with recovery assist and securing the air system.

8.39 Wire recovery systems shall comply with requirements of MPP 02(G) Helicopter Operations from Ships Other Than Aircraft Carriers (HOSTAC) *Annex A013. Harpoon systems* shall

comply with the requirements of MPP02(G) *Annex A* and STANAG 1276 *Shipborne Helicopter and UAV Harpoon-Grid Rapid Securing System*.

8.40 Where there is no integrated handling / traversing system, a powered mechanical handling device shall be provided.

Earthing Points

8.41 Earthing points shall be fitted to the Flight Operations Area, and they shall comply with Chapter 04 *Engineering Systems* Rule 15 *Electrical Protection Arrangements*, supplemented by the following.

8.42 In the flight deck areas, a minimum of one earthing point shall be provided on each side of the flight deck landing area.

8.43 The earthing points shall remain outside of the touchdown clearance area to avoid damage to the air system tyres.

8.44 The earthing points shall be located sufficiently close to connect the bonding lead to the air system while secured on deck.

8.45 Inside the hangar area, a minimum of two earthing points shall be fitted in the hangar on each side of the air system in the parked position.

8.46 One earthing point shall be fitted at each Helicopter In-Flight Refuelling (HIFR) position, in a convenient location for connecting the earthing pole to ground the air system hoist.

8.47 At least one earthing point shall be fitted at each VERTREP and/or transfer area position.

Note: Where possible, the earthing points should be located outside the rotor disk area (with airborne scatter applied) while the air system is positioned for VERTREP, while also being close enough to connect the earthing pole.

8.48 Earthing points shall be marked with a 138 mm diameter yellow circle painted around the head. Within the marked area the following text "DO NOT PAINT AIRCRAFT EARTHING POINT" shall be painted in black, constructed and painted yellow in accordance with Figure 1.

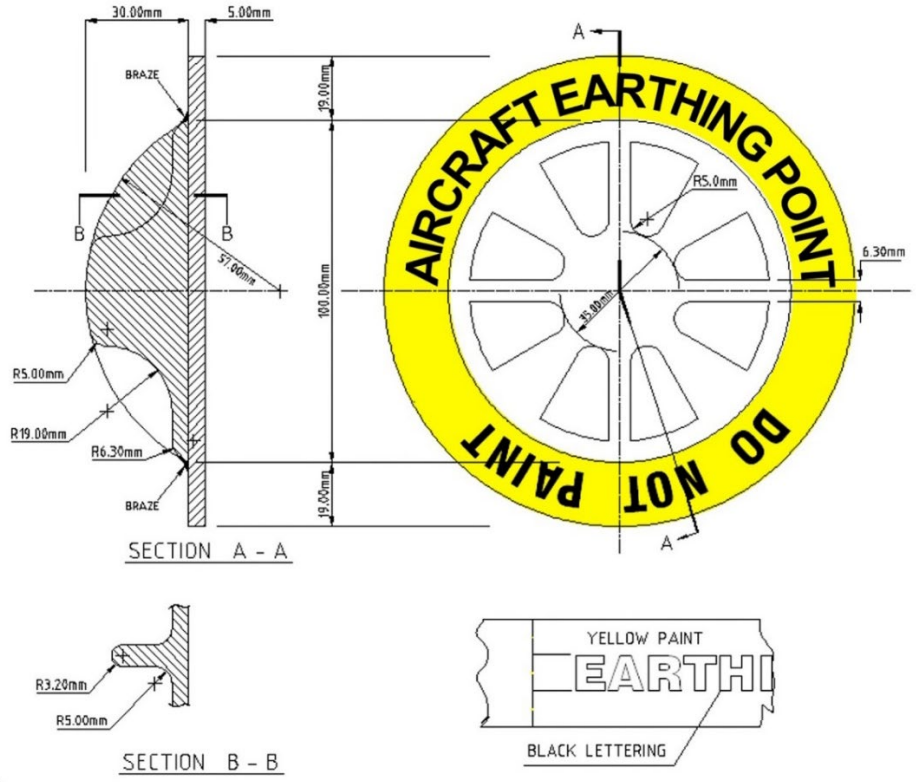

Figure 1 – Air System's Earthing Point Ship Arrangement

8.49 Earthing points shall have a ship's earth resistance not exceeding 0.1 ohms.

8.50 Earth reference points should be installed in such a manner that when in place there shall be no lateral or vertical movement of the earth reference point cap.

Earthing Pole

8.51 An earthing pole that is compatible for the air system(s) shall be provided with a minimum length of 8.5 m from hook tip to earthing clamp.

8.52 The Earthing pole resistance between the pole tip and the earthing clip shall not exceed 2 ohms.

Mooring Aids

8.53 Mooring aids (tie-downs) shall be provided and comply DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Flight Deck Equipment*, supplemented by the following.

8.54 Dimensions for tie down hooks shall comply with MPP 02 *Helicopter Operations from Ships Other Than Aircraft Carriers (HOSTAC)*, as amended.

8.55 Deck tie-down points shall be compatible with MC1 nylon and TD-1A/B chain tie-down assemblies.

Rule 9. Landing Aids

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

Solutions

9.2 Landing Aids shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Landing Aids*.

Rule 10. Aviation Services

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

Solutions

Aviation Fuel Systems

10.2 Aviation Capable Ships shall provide a fuel system for the Aviation Class specified in the OSI.

10.3 The aviation fuel system shall comply with Chapter 04 *Engineering Systems* Rule 26 *Fuel and Lube Oil Systems*, supplemented by the following.

10.4 The aviation fuel system shall meet the requirements of DEF(AUST)5695 *Petroleum Oils and Lubricants Manual.*

10.5 Type and quantities of fuel delivery equipment shall conform to operational needs in accordance with the ship's OSI and be compatible with the organic air system(s).

10.6 Pressure and gravity refuelling nozzles should comply with STANAG 3105 or STANAG 3212, whichever is relevant.

Note: The current approved naval aviation fuel delivery equipment is listed in ANP 5412.4312.8000.AO.TM.0001 - *Maintenance of Aviation Support Equipment*.

10.7 Aviation fuelling and defueling hose assemblies shall meet the requirements of ISO 1825 - *Rubber hoses and hose assemblies for aircraft ground fuelling and defueling — Specification*.

Note: See Chapter 04 *Engineering Systems* Rule 13 *Electrical Distribution and Equipment* for requirements relating to earth bonding.

Note: External earthing wires connected to the shipboard end of the HIFR equipment are not acceptable.

10.8 A fuel totaliser, measuring in litres of fuel delivered shall be installed on all refuel points.

10.9 Pressure for refuelling systems shall meet the minimum and maximum of the required air system(s).

10.10 Emergency fuel stops shall be provided at HCO, and at Helicopter Control Stations and at all flight deck fuelling stations in accordance with DEF(AUST)5695 *Petroleum Oils and Lubricants Manual*.

10.11 Emergency fuel stops shall be a stand-alone aviation fuel emergency shut-off switch/button and be clearly identified with label 'FUEL EMERGENCY SHUT OFF'.

10.12 Defuel system operating pressure shall be controllable to meet the defueling specification for the air system(s).

Helicopter In-Flight Refuelling

10.13 The helicopter in-flight refuelling (HIFR) fuelling system shall comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – HIFR*, supplemented by the following.

10.14 The HIFR equipment shall comply with STANAG 3847 *Helicopter In-Flight Refuelling (HIFR) Equipment* and ANP 5412.4312.8000.AO.TM.0001. - *Maintenance of Aviation Support Equipment*.

10.15 Stowage facilities for the fuelling rig, hose and adaptors shall be provided as near as practicable to the flight deck fuelling station.

10.16 The HIFR hose assembly, adaptors and nozzles shall be stored internal to the ship when not in use.

10.17 Non-collapsible hoses shall be stored on servicing reels with a diameter not less than the minimum allowable diameter as specified by the hose manufacturer.

Freshwater Wash System

10.18 The aviation freshwater system shall meet the requirements in Chapter 04 *Engineering Systems* Rule 25 *Fresh Water Systems*, supplemented with the following.

10.19 The minimum freshwater capacity available for aviation shall be 455 litres per day per for air system(s) with a hangar and 2275 litres per day for air system(s) without a hangar.

Note: The capacity can be increased if required by the air system type.

10.20 The freshwater system shall be capable of discharging at a rate of at least 38 litres per minute.

10.21 The freshwater system wash pressure shall be adjustable from 100 kPa to 700 kPa.

10.22 The aviation freshwater system wash system outlet shall be accessible to the landing and hangar/parking areas, with sufficient hose length available to wash down the entire aircraft on the landing spot.

Technical Water

10.23 Distilled and/or Demineralised water shall be available for the washing of air system's engine compressors.

10.24 The aviation technical water capacity shall be at least 40 litres per day per engine.

Note: The capacity can be increased if required by the air system type.

Note: The technical water quality shall meet the Air System's specification.

Servicing Fluids

10.25 Stowage spaces shall be available for the stowage and control of the helicopter servicing fluids and greases for the intended aircraft operating and support intent.

Note: Refer to the air system's specification for the quantity of servicing fluids required to be stowed.

Ship Supplied Electrical Power for Air System

10.26 The ships 400Hz electrical distribution system shall comply with Chapter 04 *Engineering Systems* Rule13 *Electrical Distribution Systems*, supplemented by the following.

10.27 Electrical AC and DC power (as required by the aircraft requirements) shall be available at each air system's starting and servicing position.

Note: Refer to the air system's specification for the electrical power requirements.

10.28 The location of the power source shall not impinge on the Fuselage Clearance Area detailed in Rule 8 *Flight Deck*.

10.29 A portable electrical power cable shall be provided for starting the air system.

10.30 The electrical power cable arrangement shall not pass through open hatches or the hangar door.

10.31 Each cable shall have a permanently mounted stowage adjacent to the supply station.

10.32 Stowage for the electrical power cable shall have a means of cable retrieval either manual or mechanical.

10.33 Ship-supplied air system electrical power supplies shall be galvanically isolated between connected air systems, and between connected air systems and ship systems.

10.34 Ship-supplied air system electrical power supplies shall minimise the length of the parallel current path, between the electrical power supply neutral-earth grounding and the air systems electrostatic grounding.

10.35 The ship's electrical power supply system for the air system shall meet the air system's power demand requirements.

10.36 The ship's electrical power supply system for the air system shall comply with ISO 6858 *Aircraft - Ground support electrical supplies - General requirements*.

Note: Electrical power input specifications may differ among various air systems. Where ISO 1540 is referred within standard ISO 6858, the appropriate electrical system standard specific to the air system should be used.

10.37 Ship power connectors for servicing air system's electrical power shall comply with AAEP-04 *Connectors for Aircraft Electrical Servicing Power*.

10.38 The ship's electrical power supply system for the air system shall be galvanically isolated between connected air systems, and between connected air systems and ship systems.

10.39 The ship's electrical power supply system for the air system shall minimise the length of the parallel current path, between the electrical power supply neutral-earth grounding and the air systems electrostatic grounding.

10.40 The ship's electrical power supply system for the air system shall be available at each air system's starting and servicing position.

10.41 The location to connect to ship's electrical power supply system for the air system shall not impinge on the Fuselage Clearance Area detailed in Rule 08 *Flight Deck*.

10.42 A portable electrical power cable for the air system shall be provided for starting the air system.

10.43 The electrical power cable for the air system arrangement shall not pass through open hatches or the hangar door.

10.44 Each electrical power cable for the air system shall have a permanently mounted stowage adjacent to the aviation station.

10.45 Stowage for the electrical power cable for the air system shall have a means of cable retrieval either manual or mechanical.

Gaseous Services

10.46 All aviation gases shall be provided in accordance with the requirements of DEF(AUST) 9011 *Aviation Technical Gases and Liquids*, supplemented by the following.

10.47 Gaseous nitrogen and dry breathing oxygen for aviation purposes, supplied to DEF(AUST) 9011 standards, shall be provided in ADF owned transport cylinders that have been specifically maintained to DEF(AUST) 9153 requirements.

10.48 Stowage of cylinders shall comply with Chapter 04 *Engineering Systems* Rule 29 *Other Compressed Gas Systems*.

10.49 Stowage arrangements of cylinders (and trolley units if required) shall be provided within the hangar or in an area nearby and accessible to the hangar.

Nitrogen

10.50 The Nitrogen gas service system shall meet the pressure requirements specified for the relevant aircraft type/s and shall be equipped with appropriate piping, hoses, gauges, regulators, fittings, etc. to service the aircraft in its normal landing position on the flight deck and in the hangar.

10.51 Where a RAST system is fitted, the Nitrogen gas service system shall meet the pressure requirements specified for the RAST system and shall be equipped with appropriate piping, hoses, gauges, regulators, fittings to service in its stowed position.

High Pressure Air

10.52 The ship shall supply a high pressure (HP) air system for aircraft requirements complying with Chapter 04 *Engineering Systems* Rule 28 *Compressed Air Systems*, supplemented by the following.

10.53 HP air should be provided to the aircraft in its normal landing position on the flight deck and in the hangar.

Low Pressure Air

10.54 A low pressure (LP) air system in accordance with Chapter 04 *Engineering Systems* Rule 28 *Compressed Air Systems* shall be available in the hangar and aviation workshops. Air supply from system to user shall be via a regulator/oiler outlet.

Helium

10.55 The Helium gas service system shall meet the pressure requirements specified for the relevant aircraft type/s and shall be equipped with appropriate piping, hoses, gauges, regulators, fittings, etc. to provide service within the hangar.

Rule 11. Aviation Compartments

11.1 The NVO shall present and justify the Solution for demonstrating compliance with Part 1. In the presentation and justification of a solution, the following shall be considered.

Solutions

Aviation Stations

11.2 Aviation compartments shall be provided and fitted out to comply with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aviation Stations Equipment, Configuration and Field of View*, supplemented by the following.

11.3 All aviation stations shall be designed in accordance with Division 2 Chapter 01 *General Requirements* Rule 10 *Control Stations*.

11.4 Aviation stations shall have escape routes in accordance with Chapter 07 *Escape, Evacuation and Rescue* Rule 16 *Escape Routes and Escape Exits*.

Explosive Ordnance Facilities

11.5 Air system's explosive ordnance (EO) preparation, stowage and handling facilities shall be designed in accordance with Chapter 10 *Dangerous Goods*, supplemented by the following.

11.6 The ship shall provide air weapons' EO stowage facilities for the Aviation Level and Class as specified in the OSI.

11.7 Location of the air systems' EO stowage facilities shall permit ready access for provision of air weapons to the flight deck area.

11.8 Specialised handling, loading and servicing equipment shall be provided in accordance with Chapter 10 Dangerous Goods Rule 6 Stowage and Handling, to support the air system weapons or stores carried.

11.9 The air system's EO stowage facilities shall have direct access to the flight deck areas.

11.10 EO stowage and Ready Use (RU) EO stowages shall be located outside of the periphery line markings.

Note: Air system's EO stowage facilities may be combined with ship's EO stowages if compliant with Chapter 10 Dangerous Goods.

11.11 The assessment for the air systems EO facilities conducted in accordance with Chapter 10 *Dangerous Goods* shall consider the operation use scenario for loading/unloading of forward firing and high explosive ordnances.

Rule 12. Electromagnetic Hazards

12.1 The NVO shall present and justify the Solution for demonstrating compliance with Part 1. In the presentation and justification of a solution, the following shall be considered.

Solutions

12.2 Emitter systems (RADAR, Communication, Laser systems) that may be hazardous to aircrew and aircraft shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports*, supplemented by the following.

12.3 A VERTREP area not located on the flight deck that cannot avoid an armament firing arc or RADHAZ area shall have a 50mm wide danger area marking applied on top of the VERTREP area markings.

Rule 13. Aviation Incident Response

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

Solutions

13.2 Aviation incident response equipment and facilities shall be provided in accordance with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aviation Incident Response*.

13.3 Ship's hull numbers, if painted within the peripheral markings, shall be in accordance with DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Typical Flight Deck Configuration*.

Rule 14. Vertical Replenishment and Transfer

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

Solutions

14.2 The ship shall provide Vertical replenishment and transfer for the Aviation Class specified in the OSI.

Flight Deck VERTREP / Transfer Facilities

14.3 Ships capable of VERTREP and Transfer shall comply with the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Annex A - Obstruction Clearances, Markings and Lighting*.

14.4 The entire operating area shall be covered with dark grey non–slip deck covering compound in accordance with Chapter 02 *Structure* Rule 8 *Coatings*. All markings are to be in white.

VERTREP / Transfer Operations Area not on a flight deck

14.5 Where the VERTREP or transfer position is not part of the flight deck, the position shall comply with MPP-02.3.3 - *Vertical Replenishment (VERTREP) Operating Area Marking, Clearances, and Lighting*.

14.6 The VERTREP operating area deck surface shall meet surface friction requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – VERTREP and Transfer Operations*.

14.7 VERTREP and Transfer Areas shall meet the requirements of DASDRM Section 6 *Aerodrome Design Requirements* Chapter 4 *Defence Shipborne Heliports – Aircraft Operating Area Access/Egress*.

Safety barriers around deck edge boundaries

14.8 If guardrails or barriers are fitted, they shall be positioned outside the peripheral markings and shall comply with Chapter 03 *Buoyancy and Stability* Rule 6 *Safety of Embarked Persons*.

14.9 If safety nets are fitted, they shall comply with Rule 8.28 Flight Deck Safety Nets.

Transfer Control Station

14.10 Transfer Control Station shall be provided and fitted out to comply with DASDRM Section 6 Chapter 4 *Defence Shipborne Heliports – Aviation Stations Equipment, Configuration and Field of View*, supplemented by the following.

14.11 The Transfer Control Station (TCS) shall be located entirely outside the transfer area such that the operator shall have a clear view of the entire transfer area and the aircraft from the control position.

14.12 If the TCS is not located on the same level and readily accessible to the transfer area, a secondary control position shall be installed to meet these criteria. This secondary position shall have two-way voice communications with the command position independent of the ship's electrical power system.

VERTREP Control Station

14.13 VERTREP Control Station shall be provided and fitted out to comply with DASDRM Section 6 Chapter 4 *Defence Shipborne Heliports – Aviation Stations Equipment, Configuration and Field of View*.