

REQUEST FOR INFORMATION (RFI)
FOR CONSTRUCTION OF ONE SURVEY TRAINING VESSEL (STV)

1. The Ministry of Defence, Government of India, intends to procure **One Survey Training Vessel (STV)** for the Indian Navy from Indian Shipyards.
2. This Request for Information (RFI) consists of two parts as indicated below:-
 - (a) **Part I.** The first part of the RFI incorporates operational characteristics and features that should be met by the Ship. Few important technical parameters of the proposed ship are also mentioned.
 - (b) **Part II.** The second part of the RFI states the methodology of seeking responses of Shipyards. Submission of incomplete response format will render the Shipyard liable for rejection.

PART-I

3. **The Intended Use of the Ship (Operational Requirements).** These are specified in brief placed at **Appendix A** of this document.
4. **Important Parameters.**
 - (a) Details of the ship are specified in brief placed at **Appendix A** of this document. Further detailed specifications will be given in the Request for Proposal (RFP) which will be issued to Shipyards who have responded to the Request for Information (RFI) and this formulation, after verifying their credentials and capabilities to construct the STV. Feasibility to build the STV with specifications indicated at **Appendix A** is to be submitted by the Shipyard.
 - (b) Budgetary quote of the STV with detailed break up of cost is to be submitted. All entities factored in the costing are to be indicated in the break up.
 - (c) Information on whether the offered ship/ design are in use by any other Navy is to be indicated.
 - (d) The STV will be operated by Crew as indicated in **Appendix A**. The maintenance of the STV post guarantee period will be carried out by Naval Dockyards/repair yards. Training for operational and maintenance personnel are to be imparted by the Shipyard/ OEM at Shipyard and *IN* premises.
 - (e) Whether the Vendor would be able to comply with all provisions of DPP 16 or not. If not, which Para/ Clause of DPP would not be agreed to, with reasons.
 - (f) Vendors may consider RFI as advance information to obtain requisite government clearances.
 - (g) Build Period/ Delivery Schedule for the STV is to be indicated.

- (j) Acceptability of the terms of payment as per DPP 16.
 - (k) Experience in Building similar Vessel along with client details.
 - (l) MOU, if any, with respect to design aspects.
5. The Shipyard should confirm that following conditions are acceptable:-
- (a) The soliciting of offers will be as per 'Single Stage-Two Bid System'. It would imply that a 'Request for Proposal' would be issued soliciting the technical and commercial offers together, but in two separate sealed envelopes. The validity of commercial offers would be at least 18 months from the date of submitting of offers.
 - (b) The technical offers would be evaluated by a Technical Evaluation Committee (TEC) to check its compliance with RFP.
 - (c) Amongst the Shipyards cleared by TEC, a Contract Negotiations Committee (CNC) would decide the lowest cost bidder (L1) and conclude the appropriate contract.
 - (d) The vendor would be bound to provide product support for time period specified in the RFP, which includes spares and maintenance tools/ jigs/ fixtures for field and component level repairs. Documentation for training/ maintenance/ repairs are also to be provided.
 - (e) The vendor would be required to accept the general conditions of contract given in the Standard Contract Document at **Chapter VI of DPP 2016**.
 - (f) **Integrity pact (if applicable)**. An integrity pact along with appropriate IPBG is a mandatory requirement in the instant case (Refer Annexure I to Appendix M of schedule I of Chapter II of DPP 16).
 - (g) **Performance-cum-Warranty Bond**. Performance-cum-Warranty Bond equal to 5% of value of the contract is required to be submitted after signing of contract.
 - (h) **Indigenous Content**. Since the categorization is Buy Indian, the ship offered must have minimum 40% indigenous content on cost basis of the total contract value i.a.w Para 13 of Chapter 1 of DPP 16.

PART - II

6. **Procedure for Response**.

- (a) Shipyard must fill the form of response as given in **Appendix B to Chapter II of DPP 16** and **Appendix C** of this document. Apart from filling details about Shipyard, details about the exact vessel meeting our generic

technical specifications should also be carefully filled. Additional literature on the vessel can also be attached with the form.

(b) Compliance Matrix with respect to Operational/ Technical Specifications indicated at **Appendix A** is to be submitted in the format specified below in hard and soft (both in editable and uneditable form) copies. Compliance to all the serials of **Appendix A** is to be indicated. Additional literature/information/documentary evidence as relevant be attached with due reference in the remarks column.

<u>Section/ Ser</u>	<u>Compliance</u> <u>(Yes/No)</u>	<u>Remarks</u>

(c) Compliance/ acceptance to issues mentioned at Para 4 and 5 above are to be clearly indicated.

(d) The filled form should be dispatched at under mentioned address:-

The Principal Director
 Directorate of Ship Production
 8th Floor, Chanakya Bhawan,
 Chanakyapuri, New Delhi - 110021
 Tele: 011-26886434
 Fax: 011-26886426
 E-mail: dsp@navy.gov.in

(e) Last date of acceptance of filled form is _____ (04 weeks from uploading of RFI). The Shipyards short listed for issue of RFP would be intimated.

7. The Government of India invites responses to this request only from Indian Shipyards. The end user of the Ship is the Indian Navy.

8. This information is being issued with no financial commitment and the Ministry of Defence reserves the right to change or vary any part thereof at any stage. The Government of India also reserves the right to withdraw it, should it be so necessary at any stage. The acquisition process would be carried out under the provisions of DPP 16.

OPERATIONAL/TECHNICAL SPECIFICATIONS
FOR SURVEY TRAINING VESSEL (STV)

SINGLE SHEET SPECIFICATIONS

Role	Training of personnel in conduct of full scale coastal and deep-water hydrographic survey of ports and harbours, approaches and determination of navigational channels/ routes, surveys of maritime limits up to EEZ / extended continental shelf
Crew	18 officers and 210 sailors
Length	New design
Beam	New design
Draught	Not more than 4.50 m (at Standard Displacement)
Tonnage	2700 tons (\pm 10%)
Propulsion	Two diesels with independent shafts
Max Speed	NLT 16 knots (at 85% MCR)
Sustained Speed	14 knots
Eco Speed	12 knots
Mission duration	60 days
Endurance at 12 Knots	6500 nm
ASW	Demolition Stores
CIWS	One 30 mm Naval Surface Gun (NSG) with Electro Optical Fire Control System (EOFCS)
Radar	Two 'I' band COTS navigation radars
IFF	IFF Mk XII (S) Transponder
Data Link	LINK II MOD III or an upgraded version
Aviation	Capable of operating one Advanced Light Helicopter (ALH)/ Naval Utility Helicopter (NUH) (with retractable Hangar)

SECTION – A**GENERAL****1. Roles and Capabilities.****(a) Primary Role.**

(i) Training of personnel in conduct of full scale coastal and deep-water hydrographic survey of ports and harbours, approaches and determination of navigational channels/ routes, surveys of maritime limits up to EEZ / extended continental shelf.

(ii) Conduct of limited oceanographic surveys for defence applications.

(b) Secondary Role.

(i) To perform limited defence role in an emergency [suitable arrangements for installation of one 30 mm Naval Surface Gun (NSG) with Electro Optical Fire Control System (EOFCS) or as indicated by Indian Navy.

(ii) Limited search and rescue capability.

(iii) Limited ocean research capability.

(iv) Hospital ship/casualty holding ship.

(v) Limited role in Humanitarian Assistance and Disaster Relief (HADR) operation.

(c) General Remarks.

(i) The ship is to be built as per the rules and regulations of IHQ of MoD(N) approved Classification Societies with an expected life of **30** years. The notation for the vessel and QAP for shipbuilding including trials shall be finalized in consultation with IHQ of MoD(N). The classification society rules will be applied for parts not covered by Naval Specifications mentioned in this document. Shipyards shall share Build Specifications with Classification Society, to improve awareness of Class about owner's requirements, and ensure their inclusion in design. Class Society is to certify that the Class Notation proposed by the Yard covers all the requirements of Build Specs/ Guideline Specifications.

(ii) The ship should comply with all the latest requirements of MARPOL/ MEPC and SOLAS Regulations as applicable on date of issue of RFP.

(iii) All machinery, sensors and equipment should have maximum reliability and maintainability for a mission time of eight weeks at a stretch.

(iv) Should conform to MEPC 159/55 Regulations or latest for ballast water, sewage, galley waste, garbage disposal etc.

(v) Should primarily incorporate COTS technology.

2. **Limiting Dimensions.** The principle dimensions of the Survey Training Vessel should be as follows:-

- (a) Draught not more than 4.5 m (at standard displacement).
- (b) Length – as per design.
- (c) Breadth – as per design.
- (d) Displacement – as per design.

3. **Tonnage.** Approximately 2700 tons ($\pm 10\%$), at Standard Displacement.

4. **Hull.** Single hull construction of a proven design; made of welded steel of DMR 249A with steel superstructure of DMR 249A.

5. **Mission Duration.** 60 days.

6. **Endurance.** 6500 nm at economical speed with 25% reserve fuel capacity.

7. **Speed.**

- (a) Maximum : Not less than 16 knots (at 85% MCR).
- (b) Economical : 12 knots.
- (c) Cruising speed : 14 knots
- (d) Operating Profile :
 - (i) 0-6 knots : 15% of time.
 - (ii) 6-10 knots : 15 % of time
 - (iii) 10-12 knots : 50% of time.
 - (iv) 12-14 knots : 20% of time.
 - (v) Operating Hours: 4500 hr pa
- (e) Capable of operating at slow speeds of 0 to 6 knots for prolonged duration (about 12 hours at a stretch).

8. **Aircraft.** The ship should be capable of operating one Advanced Light Helicopter (ALH) or Naval Utility Helicopter (NUH). Retractable Hangar for the full stowage of the aircraft. Flight Deck should be capable of sustained operations of the helicopter of approx weight of six tons.

9. **Crew Strength and Accommodation.**

(a) CO + 17 Officers.

(b) 59 Sr Sailors + 151 Jr Sailors

(c) In addition to the ship's complement, a maximum number of 10 U/T Officers and/ or 30 U/T Sailors will be embarked onboard the ship for imparting practical training on as-required basis based on the National Institute of Hydrograph (NIH), Goa Course schedules.

10. **Propulsion System.**

(a) The Propulsion System should consist of twin-shaft arrangement, each shaft driven by one Marine Engine driving a Fixed Pitch Propeller through a reversible reduction gearbox. Auxiliary Propulsion consisting of Stern Thrusters is to be provided to cater for prolonged slow speed operation of the vessel to avoid under loading of main diesel engines and enable better manoeuvrability.

(b) **Control.** An Integrated Platform Management System (IPMS) should be provided having dual redundant Gigabit Ethernet network distributed architecture system (VME 64 Standard) covering the ship machinery and systems.

(c) Facility in all machinery compartments for monitoring all vital parameters from the bridge.

(d) Bow and stern thrusters are to be provided.

11. **Seaworthiness.**

(a) Operational seaworthiness up to Sea State 5.

(b) Transit on all headings up to Sea State 7.

(c) Ability to survive on best heading up to Sea State 8.

(d) Helo operations upto Sea State 5.

12. **Stabilisers.** The ship is to be provided with active stabiliser system to ensure optimum utilisation of weapons, sensors, aviation facilities as well as operational and habitability criteria of the ship along with reduction of the heavy rolling of the ship.

13. **Operating Conditions.**

(a) Ambient temperature up to +45°C (Dry bulb).

(b) Water temperature up to +40°C.

(c) Relative Humidity of up to 100% at 35°C and salinity of water of upto 35 ppm.

- (d) **Sea Way Conditions.**
- (i) Roll : Max 20° with 10 sec period.
 - (ii) Pitch : Max 6° with 20 sec period.
 - (iii) List : Max 20° from vertical.
 - (iv) Trim : Max 5°

14. **COTS Technology.** COTS technology is to be adopted in maximum possible areas of the vessel.

15. **Ergonomics.** Latest design concept for the vessel, with respect to ergonomics/ functional aspects and crew comfort are to be adopted. Sound insulation is to be provided to all accommodation, work spaces etc. Modern modular accommodation spaces need to be provided in the ship iaw *IV* specifications. Requirements as per in accordance with extant orders on the subject are to be met.

16. **Inter-docking Period and Ops-cum-Refit Cycle.** An inter-docking period of five years is to be catered. The ship should have an operational cycle of 36 months.

17. **Hydrographic Equipment.** The list of main hydrographic equipment and systems is placed at **Appendix A**. The hydrographic equipment includes the following:-

- (a) **Auxiliary Equipment.** The list of auxiliary equipment to support main equipment will be provided.
- (b) **Drawing Instruments.** The list of drawing instruments will be provided.
- (c) **Miscellaneous Hydrographic Stores and Publications.** The list of miscellaneous hydrographic stores will be provided.
- (d) **Onboard Spares (OBS).** Onboard spares for all hydrographic equipment (main and auxiliary) for two years are to be supplied.
- (e) **Subscription.** Lifetime licenses for all software are to be provided. Subscription associated with hydrographic software suites in equipment including subscription based Satellite Based Augmentation System (SBAS) satellite signal of DGPS are to be included for not less than 10 years.

18. **Air Conditioning.** Air Conditioning to be as per Def Stan 02-102, Issue 3. AC plants should cater for required load plus 100% reserve capacity.

19. **Power Supply.** Main supply of 415V 3 Phase 50 Hz three wire floating neutral with a lighting supply of 230V 1 Phase 50 Hz with 100% reserve. Emergency 24V DC from battery banks.

20. **Training.** Mandatory training to be imparted to the ship's crew and maintainers, by the OEM/ OEM Reps/ Shipyard, for the operation and maintenance of machinery and equipment installed onboard in consultation with *IN*. The ship's crew and shore maintenance staff and staff of training schools will be trained at the Shipyards / OEM's premises / onboard (as applicable) on the operation and maintenance of hull, machinery and equipment installed onboard. Shipyard will arrange for such training by OEM reps prior to delivery of the vessel. The training schedule will be prepared in consultation with IHQ of MOD (N) well in advance. The cost of the training will be borne by the shipbuilder. The training program will include the following:-

(a) Introductory training by OEM reps at factory premises for each of the ships. This is required to provide the necessary focus to the end-users by giving them necessary input with regard to operation, maintenance, and fabrication process and repair methodology.

(b) The shipbuilder will further provide operator, user and maintainer training to the crew on-board at the yard with OEM's assistance during System Commissioning within the time frame of commissioning requirement. Repair methodologies are to be part of the training.

(c) Training aids comprising of cut section models, audio – visual / CBT packages (on operation, maintenance and repair activities) are to be provided for hull, all import machinery, equipment and system.

(d) The proposed training calendar clearly bringing out the duration of training and the number of personnel (ship's crew and shore maintenance staff) will be submitted along with the Build Specification.

21. **First Outfit of Naval Stores.** Stores required on board for carrying out day-to-day maintenance. List of First Outfit of Stores will be indicated subsequently which are required to be provided by the ship builder.

22. **Labour Saving Device.** Labour saving devices/ equipment/ tools are to be provided to the ship in accordance with the latest *IN* policy letter.

23. **UNREP.** UNREP as per Def Stan 07-279, Def Stan 22-90 and Def Stan 22-92.

24. **Anchor Chain Cable.** Anchor Chain cable and accessories should be in accordance with prevalent naval standards.

25. **Incinerator.** Incinerator and Garbage Disposal Unit for disposal of solid garbage shall be provisioned as per MARPOL Regulations – Annex V and MARPOL Regulation MEPC 76(40), MEPC 93(45) and MARPOL Annexure VI for exhaust requirements.

26. **On Board Spares (OBS).** Spares required for undertaking running hour based/ periodic maintenance/ rectification of defects, which if not immediately available might impair the operational efficiency of the ship or operational availability of critical equipment are to be provided. These include spares for the jobs within the ship staff capability as well as those undertaken with yard assistance. Data of these

spares to be provided in ILMS format. This should also include critical spares to meet action damage requirements. It is to be noted that besides equipment/machinery, OBS is to be supplied also for yard items such as valves, compensators and other system fittings considering operational cycle of two years.

27. **Base & Depot Spares (B&D)**. Offers for OEM recommended B&D Spares (for 05 years exploitation of equipment) are to be submitted for ranging and scaling by ship-builder as per format. The list should include complete Part Identification List (PIL)/ Comprehensive Parts List (CPL) for the equipment to aid in Ranging and Scaling.

28. **Accounting**. The vessel should be 'self-accounting' type.

29. **Special Features**.

(a) **Survey Motor Boats and Centreline Crane**. Two Survey Motor Boats (SMBs) of approx length 11.0 m and two SMB are of approx. length 9.0 m. All four SMBs to be hoisted by a suitably located Centreline Crane with a provision of stowage on the deck. The crane should be telescopic/ retractable with a minimum outreach of 5m beyond the ship side. The Safe Working Load (SWL) of the centreline crane for lowering and hoisting of SMBs should be at least 10 tonnes at maximum outreach.

(b) **RHIB**. Two 7.0m RHIB as Sea Boat with its own single-arm davit for hoisting/ lowering capable of being hoisted and lowered at slow speeds and re-configurable for LIMO role with provision for fitting LMG/ MMG.

(c) Two inflatable Gemini crafts with OBM.

(d) **Mechanical Transport**. The following mechanical transport is to be provided to the ship:-

(i) One x MUV air-conditioned in passenger configuration. The MUV should be with minimum capacity 7 seater and 120 BHP.

(ii) One x 52 Seater air-conditioned bus (for field visits and education tours).

(iii) One x MUV air-conditioned with open trailer. The MUV should be with minimum capacity 7 seater and 120 BHP.

(iv) Two x scooters/ bikes (minimum 100cc and above).

(v) Three x Listers for movement of stores within dockyard (minimum power of 3.5 HP).

(vi) Three MHE.

(vii) Three stackers.

- (viii) Two sets of covers for all vehicles.
- (ix) Seven bicycles.
- (x) Two pallet trolleys for handling heavy cargo onboard.

(e) **Utility Crane.** A telescopic crane capable of lifting three tons and with an arm length extending five (05) metres beyond the ship side for lifting MUV/ SUV and for hydrographic stores etc. is to be fitted at a suitable location onboard.

(f) Quarter deck below the helo deck for oceanographic/ hydrographic evolutions in addition to the below-mentioned:-

- (i) Winches for portable survey equipment like Side Scan Sonars, Remotely Operated Vehicle (ROV).
- (ii) Arrangements for tow aft.
- (iii) Space for capstan, bollards and fairleads.
- (iv) Adequate working area for seamanship, training and hydrographic survey evolutions.

(g) Bridge design should cater for bridge wings.

(h) Oceanographic davit with 10,000m cable for Sound Velocity Profiler and other oceanographic sensors at suitable location on foxtel.

(j) **Class Rooms.** Two modern class rooms one with a capacity of 30 and the other with a capacity of 10 to train personnel would also serve as facilities for planning and execution of the hydrographic surveys. It should be equipped with a 52" LED (or later generation) display capable of interfacing with laptop/ PC for briefings and presentation. In addition, it should include state-of-the-art training gadgets such as smart boards, projection system, recordable Public Address (PA) system and training LAN. The class rooms should have mini lockers and coffee/ tea vending machines to cater for 40 trainees.

30. **Additional Spaces/Workshops.** The following additional stowage spaces/ workshops are envisaged over and above the standard Naval spaces/ workshops:-

- (a) Stowage space for the optical/ electronic portable survey equipment with two-tier racks on all sides and three cupboards (air conditioned).
- (b) Stowage space for mechanical survey equipment.
- (c) Stowage space for ROV and associated equipment along with test/ maintenance workshop (air-conditioned in addition to Para 30 (f) (v)).
- (d) Stowage space for Boat spares/ equipment along with maintenance workshop.

- (e) Stowage/ work space for survey equipment (all AC spaces) as follows:-
 - (i) Survey Instrument stores - 02
 - (ii) Oceanographic lab - 01
 - (iii) Bulk Instrument Stores - 02
 - (iv) Survey Training Store - 01

31. **Rules and Regulations.** The International conventions and regulations, as listed below are to be applied:-

- (a) International Convention for Safety of Life at Sea (SOLAS).
- (b) International Convention for Prevention of Collision at Sea (COLREGS).
- (c) International Convention for Prevention of Pollution from Ships (MARPOL) along with IMO regulation MEPC 159/55.
- (d) Rules of Navigation and Tonnage Regulations for Suez and Panama Canal Authorities, including measurement.
- (e) ISO 9943 – Ventilation and Air-Treatment of galleys and pantries with cooking appliances.
- (f) International convention on Load Lines, 1966 and the International Convention on Tonnage Measurements.

Annexure A

(Refers to Para 17 of Section A)

LIST OF MAIN HYDROGRAPHIC EQUIPMENT AND SYSTEM

Ser	Equipment	Qty	
1	Data Acquisition and Processing System[DAPS] (for ship and boats) with network license for 40 nodes #	08	
2	Geodetic GNSS Land Survey systems	05	
3	Digital Side Scan Sonars with Data Acquisition and Processing System with network license for 40 nodes \$	03	
4	(a) Hull-mounted Multibeam System (Deep) with Data Acquisition and Processing system	01	
	(b) Portable Multibeam System (Shallow) for boats with Data Acquisition and Processing system	02	
	Both the Deep and Boat Multibeam systems are to be from the same OEM to ensure compatibility and interoperability		
5	(a) Ship	(i) Dual-frequency Singlebeam Echosounders Deep/Medium %	01
		(ii) Dual-frequency Singlebeam Echosounders Medium/Shallow %	02
	(b) Survey Motor Boat	Dual Frequency Single beam Echosounders Medium/Shallow %	04
6	Dual-frequency Singlebeam Medium/ Shallow Echo sounders (Portable)	02	
7	DGPS Long-range Positioning Systems (Subscription based Satellite corrections)	08	
8	Electronic Total Stations	04	
9	Electronic Digital Levels	04	
10	Water Level Meters (Radar type)	02	
11	Acoustic Doppler Current Profiler (ADCP) (Hull mount and portable transducer) with one Data Acquisition and Processing system with network license for 40 nodes \$	01	
12	Current Velocity meter (Portable)	04	
13	Remotely Operated Vehicle (ROV) with Data Acquisition and Processing system	01	
14	Conductivity Temperature and Depth (CTD) Profiler with one winch	02*	

- Includes 40 (Forty) high-end Work Stations.

\$ - The software with network licences will be installed on the Work Stations at Ser 1.

% - Includes one Motion/ Heave Sensor for each system.

* - Two CTD sensors and one winch

SECTION – B**HULL**

1. **Hull Form.** The vessel is to be of single hull construction of a proven design either existing in service or supported by model testing to prove the efficacy of design meeting all the requirements specified in the RFP. Detailed model test shall be conducted in accordance with latest version of Naval rules. Wind tunnel tests will be carried out to confirm suitability for helo operations and flow of exhaust. If there is any deviation from the existing proven design, firm shall repeat model test in the presence of *IN* reps. The line plan of the ship has to be frozen post Model Test.
2. **Construction Material.** The main hull and superstructure should be of all welded steel of DMR 249A. DMR 291 Aluminium may be used for minor bulkheads/structures in case of necessity to reduce weight. However, Aluminium is not to be used for any locations forming part of the structural fire boundary. IHQ of MoD(N) approved material including fire retarding paints, curtains, deck covering and insulations are to be used for all areas.
3. **Plate Thicknesses and Scantlings.** Corrosion allowance is 2 mm for keel plate. Corrosion allowance for all other hull plating and platings constituting the boundary of all tanks, wet spaces and below a line of 1m above the design deep water line should be 1.5 mm. These allowances are in addition to the manufacturing rolling allowances.
4. **Paint Scheme and Deck Covering.**
 - (a) Long life paint schemes in accordance with the latest issue of IHQ of MoD(N) specifications are to be applied under paint manufacturer's supervision.
 - (b) Coatings for protection of internal spaces (machinery bilges, voids) and tanks are to be undertaken as per IHQ approved specifications.
 - (c) Intumescent fire retardant paints as per IHQ of MoD(N) specifications are to be applied in all internal stowage and accommodation spaces.
 - (d) Deck covering scheme in accordance with the latest issue of Naval standards is to be provided for internal compartments and alleyways in both dry and wet areas.
 - (e) Latest standards approved by IHQ MoD(N) are to be adhered to for all other locations not covered above.
5. **Hull Protection.**
 - (a) Cathodic Protection is to be provided by means of an ICCP System. The specifications of ICCP system shall conform to latest IN specifications. The equipment is to be shock graded as per NSS II.

- (b) IHQ of MoD(N) approved Sacrificial Anodes as per latest *IV* specifications as approved by owner are to be fitted wherever required.
6. **Stability**. The vessel should satisfy the stability requirements for both intact and damaged condition, including growth margins as per extant orders for naval vessels in military role.
7. **Hull Vibration**. The design for noise, lighting and vibration should be in accordance with latest naval standards.
8. **HVAC System**. HVAC system is to be based on Def Stan 02-102, Issue 3, 2007 and shall be of TACs concept. The Air Conditioning plant should be designed for the following parameters:-
- (a) **External Temperature (Tropics)**. 41°C Dry BuIb (DB) and 39°C Wet Bulb (WB). Surface Sea Temperature 40°C.
- (b) **Internal Temperatures (Air conditioned spaces)**. All compartments (except Galley) 23.5°C Effective (27°C DB/19.6°C WB, RH 40-60%) Galley - 29°C Effective (34.5°C DB /26°C WB).
9. **Doors/ Hatches**.
- (a) All WT/ GT/ Cat 'A' doors and hatches are to conform to latest IHQ of MoD(N) Specifications.
- (b) **Other Access and Closures**. All other access is to be provided as per access policy adhering to extant naval standards.
10. **WT and GT Integrity**. Watertight boundaries are to be in accordance with latest extant orders regarding surface ship subdivision and for ship's stability. All watertight boundaries should extend upto the V-Line and all openings below the V-Line should be watertight. All other openings may be air/ weather tight depending on the design. Growth margin to be given according to the latest extant Warship rules. APT to be done in accordance with extant naval standards.
11. **Structural Fire Protection and Fire Zone Boundaries**.
- (a) Structural fire protection and fire zone boundaries are to be provided as per Classification Society Naval rules.
- (b) Fire Zoning is to be provided in accordance with extant naval orders covering the following aspects:-
- (i) Subdivision of the vessel into main vertical zones.
- (ii) Construction of fire zone boundaries.
- (iii) Independent ventilation systems in each zone. Dedicated smoke extraction systems in each zone.

12. **Sewage Treatment.** Sewage treatment system/ plant is to be provided which is capable of performing the following functions:-

(a) Integrated Vacuum Toilet and Sewage Treatment System is to be provided which confirms to latest naval standards for treatment of Black Water only.

(b) Incinerator for disposal of solid garbage as per latest MARPOL standards.

(c) The STP compartment should be provided with adequate ventilation and fitted with H₂S sensors iaw extant naval orders.

(d) Type test certificate of STP and MARPOL compliance certificate by Class Society specifying the validity is to be submitted.

13. **Shipwright Workshop.** A suitable hull workshop with requisite machine tools and equipment / storage is to be provided onboard.

14. Glass gauge draught indications (forward, midships and aft), with scales in mm are to be provided inside the ship.

SECTION – C

STEALTH FEATURES

1. The ships should have the following stealth features to the extent possible, in terms of acoustic, radar/ IR signatures and ambient noise:-
 - (a) All uptakes/ intakes will be insulated as per prevailing standards.
 - (b) SV mounts to be provided for low acoustic features.

SECTION – D**WEAPONS AND SENSORS**1. **ASW.**

(a) **ASW Demolition Stores.** The ship's magazine should cater for stowage of appropriate demolition stores.

(b) **Scare Charges.** The ship is to be fitted with two R/U lockers, designed as per IHQ of MoD(N) policy letter for 40 scare charges each.

2. **Gunnery.**

(a) **Main Gun.** The ship is to be fitted with one 30 mm Naval Surface Gun (NSG) with Electro Optical Fire Control System (EOFCS).

(b) **LIMO.** The ship is to be fitted with two 12.7 mm Stabilised Remote Controlled Guns (SRCG).

(c) **Night Vision Devices and Binoculars.** The ship is to be provided with ten night vision devices and ten optical binoculars.

(d) **Small Arms.** The ship is to be provided with small arms as per survey vessel scale. Adequate racks are to be provided for storage of the small arms.

Sr	Small Arms	Qty
(i)	HMG	02
(ii)	LMG	03
(iii)	INSAS	30

(e) One Electro Optic Infra-Red Search and Track (EOIRST) System.

(f) **Ammunition.** The ship is to be outfitted with 30 mm NSG ammunition as per gun scale. Magazine is to be build in accordance with NMER for the following:-

(i) 30 mm rounds.

(ii) 02 RU lockers for small arms.

(iii) Pyrotechnic Locker.

(iv) 02 hand grenade and scare charge lockers.

(g) Gun mounts for HMG, MMG and LMG are to be provided as indicated below. The mounts are to be provided with the shield of double-armour plating (dismantle-able type) for the protection of the operator.

- (i) Four mounts for HMG – one mount each on Bridge Wings Port and Starboard side, foxle and quarterdeck.
- (ii) Two mounts for MMG – one mount each on Bridge Wings Port and Starboard side.
- (iii) Eight mounts for LMG - one mount each on Bridge Wings Port and Starboard side, three mounts each on Port and Starboard side on the main weather deck as per NAS warrant.
- (h) A suitable QRT gear storage locker, located on upper deck, is to be catered for storing QRTs equipment/ gear in harbour.
- (j) One Acoustic Warning Device (as per specifications provided by IHQ MoD (N)).
- (k) Automatic Fire Detection and Suppression (Magazine sprinkling) System arrangements for magazine as per NMER.
- (l) Magazine flooding system as per NMER.
- (m) Check fire bells at all gun mount locations and bridge/ ops room as per specifications provided by IHQ MoD(N).

SECTION – E**NAVIGATION AND AIO**

1. **Bridge.** The Bridge is to be highest compartment in the foremost part designed with the following features:-

(a) Modern Integrated Bridge with clear all around vision through wide clear large sized windows, without obstructions as per latest ABS, IMO and DNV regulations.

(b) IBS integrated with two 'I' band COTS radars and other sensors and sub-equipment as per Para 15 to 22.

(c) Plotting Room adjacent/ aft of the Bridge for hydrographic suite of equipment. Plotting Room to be of same width as Bridge.

(d) One chart table.

(e) Advanced Composite Communication Suite (ACCS) for external communication.

(f) Hardwired intercoms and telephone for internal communication.

(g) Seating arrangement for Flag Officer, Commanding Officer and Quarter Master to be provided.

(h) Remote control of main engines and auxiliary machinery through IPMS.

(j) CCTV Monitoring System integrated into the IBS.

(k) Two SAR all round search light with visibility/ detection capability of detecting 1 sqm object at a distance of 5 cables.

(l) Two toilets and one pantry should be provided on the same deck in proximity to the Bridge.

2. **Charthouse.** The Charthouse should be interconnected to the Bridge. The Charthouse should be large enough to accommodate the equipment fit, chart folios with sufficient storage space, and also function as the Office space for the ND department. It should be provided with two PC (connected on LAN) and a large printer with scanning facility.

3. **Briefing Room.** A Briefing Room should be provided in the vicinity of the Bridge to cater for navigational/ Helo briefings. This room should be able to accommodate about 40 personnel and have modern audio-visual aids/ smart boards and multimedia projection system.

4. **Radar.** The radar suite of the ship is to comprise of two 'I' band COTS navigation radar, integrated with the IBS MFCs. All round coverage for the 'I' band COTS radars to facilitate smooth launch/ recovery of helo is required.

5. **Gyro.** The ship is to be fitted with two STD 22 Anschutz Gyros. The repeaters of the Gyros are to be fitted as follows:-

(a) Centreline pelorus in bridge, with azimuth circle.

(b) Pelorus on either bridge wing with azimuth circles. One gyro pelorus on bridge top.

(c) Digital and analogue repeaters at the steering position in the Bridge, ASP and Emergency Conning Position (ECP). Analogue repeaters to be provided for bridge top, quarterdeck and LSO cabin also.

(d) Digital repeaters in the Survey Chart Room (SCR) and Captain's Cabin (day and night). In addition, digital output to be provided at ten locations catering for interfacing with multiple hydrographic equipment.

6. **Auto Pilot.** The ship is to be provided with an autopilot with control position on Bridge.

7. **Met Instruments.** The standard outfit of meteorological equipment is to be provided, along with necessary certification from the recognized agencies, as follows:-

(a) APT Weather Fax (Multifax) receiver	-	1
(b) Ship based Automatic Weather Observation System(AWOS) indicating both true and relative wind, with repeaters in the Bridge and the Ops Room and integrated with IBS	-	1
(c) Precision Aneroid barometer	-	2
(d) Marine bucket with sea thermometers	-	2
(e) Max/Min Thermometer	-	2
(f) Dry/ Wet bulb thermometers	-	2
(g) Whirling Psychrometer	-	2
(h) Whirling Asman Psychrometer	-	2
(j) Hand held anemometer with wind vane	-	1
(k) Thermograph weekly	-	2
(l) Barograph weekly	-	2
(m) Hair hydrograph weekly	-	2

(n)	Marine Stevenson screen	-	1
(p)	Wind socks (small size)	-	2
(q)	Mobile Met Kit	-	1
(r)	Marine 'Q' Barometer	-	1

8. **IFF.** The ship is to be fitted with one IFF Mk XII (S) transponder.

9. **Helicopter Control.** The Bridge and Operations Room (Survey Chart Room) are to be equipped to control helicopters from any IBS MFC. All necessary communications are to be available. Roll and Pitch Indicators are to be provided on the Bridge, in the Operations Room (Survey Chart Room) and LSO Cabin.

10. **Telescopic Azimuth Sights.** The ship is to be provided with six portable telescopic azimuth sights for fitment on azimuth gyro repeaters.

11. **Log.** The ship is to be fitted with one Keltron EM log of latest version. The control unit is to be fitted in the Bridge and Digital repeaters are to be integrated with the IBS. Output of log to be available in MCR, Operations Room (Survey Chart Room) and LSO also.

12. **Echo Sounder.** The ship is to be fitted with single beam dual channel Echo Sounder of latest version as specified in the hydrographic equipment package. Digital repeaters are to be provided in the Survey Chart Room (operations room), Bridge, Plotting Room, Captain's cabin and Quarter Deck (for side scanning operations).

13. **DGPS.** The ship is to be fitted with two independent DGPS receivers (subscription based satellite corrections with minimum 10 years subscription), both with sufficient fan out ports to be able to provide position data to other ship systems. In addition, six hand held GPS receivers are also to be provided.

14. **Compass.** The ship is to be fitted with one transmitting reflecting type steering magnetic compass at a suitable location. Six portable boat compasses are also to be provided.

15. **Data Link.** The ship is to be provided with Link II MOD III or an upgraded version.

16. **Operations Room (Survey Chart Room).** A composite Operations Room with the following facilities to be provided:-

(a) The dimensions of the Survey Chart Room should be atleast 8.5m x 8m.

(b) IBS MFCs fully integrated with the nav sensors and IPMS CCTV system.

(c) Provision must be made in the Ops Room to conduct operational as well as aircrew briefing. A 42" LED panel along with a computer is to be provided for briefing/ debrief.

- (d) A Plotting Table of approximate dimensions 2.2m x 2.2m x 1.3m with veneer top and 05 pull out racks for stowage of charts, fair sheets etc.
- (e) Adequate tables of modular design for two hydrographic data processing stations and ten (10) workstations along with seating arrangement for ten personnel.
- (f) Stowage arrangement for drawing tools and equipment, three library cupboards for hydrographic publications and three filing cabinets.
- (g) Two heavy duty A3 size Multifunctional (printer, scanner and copier) document management and reproduction machines for survey documents.
- (h) One A0 size plotter cum scanner with three sets of consumables.
- (j) **SCR Networking.** A separate and independent Survey Operations LAN with fibre optic backbone is to be installed for the Survey Chart room, Plotting Room and Bridge to enable online availability of data from various survey sensors to the respective users. Survey Operations LAN would be independent of the Ship's Operations (Op) and Administrative (Adm) LAN's. Provision should exist to connect to the Op LAN or Adm LAN when required.
- (k) A compartment adjacent to and with access from Survey Chart Room is to be provided for the Deep Water Multibeam System. The temperature in this compartment is not to exceed 20° C with both systems working. The approximate dimension of the compartment (L X B) would be atleast 3.5 m X 3.5 m.
- (l) **Hydrographic Sensor and Equipment Integration (HSEI).** The integration of all ship fitted, portable and boats hydrographic sensors and equipment must be undertaken to enable synchronisation with data logging system and post-processing software. This would form part of the Survey Operations LAN. All hydrographic survey systems must be fitted with regulated power backup and uninterrupted power supply. A hydrographic sensor and equipment integration (HSEI) study must be undertaken with a detailed report covering all aspects of hydrographic system integration for meeting the envisaged role of the vessel. The same to be submitted to IHQ of MoD (N) for approval. It is essential that a central guiding and co-coordinating agency in the form of a HSEI consultant be employed who would specify the integration requirements of various hydrographic equipment, set guidelines and trial documents to ensure equipment and sensors are comprehensively and seamlessly integrated prior delivery. The primary aim of the tasks and services to be undertaken by HSEI shall be to design, integrate and interface various Hydrographic equipment to ensure a comprehensive and fully functional suite including all associated equipment and systems.

Integrated Bridge System

17. The ship should be equipped with an Integrated Bridge System (IBS). The IBS is defined as a combination of systems, which are interconnected in order to allow

centralized access to sensor information or command/ control from workstations, with the aim of increasing the safety of the ship and her navigational efficiency. The configurations/ specifications will be intimated by IHQ MoD (N).

18. **Functionalities.** The IBS should provide for the following functionalities:-

- (a) ECDIS.
- (b) ARPA.
- (c) Conning Display.

19. **Configuration.** The IBS configuration should include the following components:-

- (a) Multi Function Consoles (MFCs).
- (b) Multi Function Displays (MFDs).
- (c) A dual redundant network, along with network switches and /or hubs and gateways, as required.
- (d) Sensor Integration Units/ Sensor Concentrators, to interface with navigational aids.
- (e) Radar switching units or similar equipment, to enable control of the radar trans-receivers through the Multi Function Consoles.
- (f) A 'Fixed Type' Voyage Data Recorder (VDR).
- (g) Optical Bearing Devices.
- (h) Integrated Captain's Consoles.
- (j) A gateway to exchange data with the IPMS/ BDCS network (if the ship being fitted with IBS is provided with IPMS/ BDCS).

20. **System Implementation.** The system solution should be implemented to ensure high reliability and availability. This is to be ensured by an open architecture utilising redundant Multi Function Consoles and Multi Function Displays in combination with monitoring and control facilities distributed in a number of autonomous sub-systems, thus minimising the consequences of the failure of a sub- system and maintaining the highest possible operational availability.

21. **Source of Equipment, Interface Issues and Bridge Design.**

- (a) **Bridge Design.** A two-dimensional isometric layout design of the Bridge will be required to be provided to IHQ of MoD(N) for approval. The design should be in compliance with IMO and Class rules.

(b) **Scope of Supply and Interfacing Issues.** In-addition to the equipment listed at Para 19 above, the equipment that are required to be included within the scope of supply of IBS and the related interfacing requirements are as follows:-

<u>Ser</u>	<u>Equipment</u>	<u>Scope of Supply and Interfacing Requirements</u>
(i)	Navigation radar trans-receivers.	(i) Included in the scope of supply of the IBS from IHQ of MoD (N) nominated vendor list or duly approved by IHQ of MoD (N) prior induction.
(ii)	AIS	
(iii)	Transmitting Magnetic Compass.	
(iv)	Automatic Weather Observation System (AWOS) for Wind Speed and Direction, Temperature, Pressure and Relative Humidity.	(ii) The IBS vendor shall be responsible for the complete system integration.
(v)	GNSS	(iii) IBS is to be interfaced with Wind Speed Direction Indicator (WSDI) if the ship is not fitted with AWOS. (iv) The sensors integrated with the IBS, other than the Nav radars namely AIS, AWOS, DGPS and Transmitting Magnetic Compass should have their own dedicated displays.
(vi)	Steering System with Auto Pilot.	(i) These equipment would be shipyard supply. (ii) IBS is to be interfaced with the equipment fitted on board. (iii) In cases where the ship system do not provide data as required by IBS (viz syncro /proprietary protocols), the necessary conversion is to be undertaken at the IBS end.
(vii)	Gyros.	
(viii)	Dual Frequency Echo Sounder.	
(ix)	Electro Magnetic Log.	
(x)	Integrated Platform Management System (IPMS) – for input data, as subsequently described in this document.	

Numbers and Locations of MFC and MFDs for IBS

22. The numbers and locations or MFCs for IBS are tabulated below :-

Ser	Compartment	Number of MFCs	Remarks
(a)	Bridge	Three	(i) IPMS consoles will be in addition to MFCs. (ii) One of the MFCs would normally be selected to display

Ser	Compartment	Number of MFCs	Remarks
			the 'Conning Mode'.
(b)	Chart House	One	The MFC should cater for ENC server functions
(c)	Operations/ Survey Chart Room	Two	Inclusive of MFC for Propulsion Control/ Battle Damage Control System.

23. The numbers and locations of MFDs for IBS are tabulated below:-

Ser	Compartment	No. of MFDs	Remarks
(a)	Bridge	Three	(i) Two on forward bulkhead, port and starboard. (ii) One above the chart table.
(b)	Bridge Wings	Two	(i) One each on port and starboard bridge wings. (ii) Since the bridge wings are exposed, these two MFDs should be suitably designed to withstand the environmental conditions in exposed positions.
(c)	Chart House	One	Above the chart table
(d)	CO's Day Cabin	One	As required
(e)	CO's Night Cabin	One	As required
(f)	ASP	One	In front of steering wheel
(g)	FLYCO	One	In front of LSO
(h)	NO's Cabin	One	As required
(j)	Ops/ Survey Chart Room	One	As required

24. As a fallback arrangement in the event of a failure of IBS, direct connectivity from equipment critical to the ship's navigational safety is to be provided to two MFCs on the bridge, bypassing the networking units, sensor concentrators, data distribution units. These equipment are: -

- (a) Both navigation radar trans-receivers.
- (b) Speed log.
- (c) Echo Sounder.
- (d) AIS.
- (e) GPS/ DGPS.
- (f) Gyro.

SECTION – F**COMMUNICATION**

1. **Composite Communication System.** The ship should have an Advanced Composite Communication Suite (ACCS) integrating all communication equipment to the communication data bus. The ACCS should be fully compatible with the data link equipment and should have following features:-

- (a) Full integration of external communication including digital sets and software defined radios.
- (b) Security of voice and data management system.
- (c) Centralised management system.
- (d) Increased reliability through duplication of critical equipment in different areas of ship.
- (e) One integrated Digital Flash Memory based recorder (Multi-channel recorder) for online recording of communication including MMB.

2. **Fixed Radio Sets.**

- (a) One X 1KW HF Tx with RCU, ALE and high speed data modem.
- (b) Either of the two combinations, depending upon the induction schedule of Software Defined Radios (SDRs):-
 - (i) Three X Software Defined Radios (SDRs) with RCUs, capable of operating in V/UHF and HF bands.
 - (ii) Five X V/UHF Tx/RX with 02 X ECCM units. 02 X 100 W HF Tx/Rx with RCU
 - (iii) Four x All Wave Receivers (total of 02 X HSDMs and 02 X G/MSK attachments to be provided).

3. **Satellite Communications.**

- (a) One x 'Ku' band SATCOM terminal (nominated as BNE).
- (b) One x UHF SATCOM terminals (nominated as BNE).
- (c) Two x MSS Tx-Rx with secrecy device (inclusive of workstation and printer) (nominated as BNE).
- (d) One x INMARSAT Maritime voice cum high-speed data terminal with accessories (nominated as BNE).

4. **Associated Systems.**

- (a) One x Digital Flash Memory based recorder (to be supplied as part of ACCS), interfaced with ACCS for online recording of communication including MMB.
- (b) Two X Broadcast PCs with printers and UPS.
- (c) One X Emergency UHF and VHF aerials.
- (d) Two X Wire aerials.
- (e) One x Data-link System with associated operating consoles.

5. **Cryptographic Equipment.**

- (a) Two x Crypto PCs with printer along with UPS.
- (b) One Sanchar PC with printer and UPS with provision for connecting to LAN extension on Jetty.
- (c) Two On/ Off line Cipher system.
- (d) Two x SECFAX equipment.
- (e) One x SECTEL.
- (f) Two-key safe for SOX publication and CBs to be provided as follows:-
 - (i) MCO - 03
 - (ii) SDO - 02
 - (iii) SCO Cabin - 01
 - (iv) SHS Cabin - 01 (large size)
 - (v) CO Cabin - 01
 - (vi) Bridge - 01
 - (vii) EW Office - 01
- (g) 02 x Hotice Card

6. **GMDSS Suite.**

- (a) One X Inmarsat C Terminal with EGC and printer (with battery backup/ UPS).
- (b) Two X VHF MMB Tx/ Rx with DSC (with battery backup/ UPS).

- (c) One MF/HF DSC with Navtex Rx and printer.
- (d) Two X SARTs.
- (e) Two x EPIRB (406 MHz).

7. **Portables.**

- (a) Four x HF Manpack sets with data modem, associated battery chargers and one spare battery for each set. One PC to be provided for data applications.
- (b) Two x V/ UHF Manpack sets along with associated battery chargers and one spare battery for each set.
- (c) 30 x handheld VHF Tx/Rx with VOX (for hands-free usage), waterproof bag, associated battery charger and one spare battery each.

8. **Emergency Power Supply.** One emergency generator must be fitted onboard to provide sufficient power to operate the following communication equipment, in case the primary PGD System of the ship is not available:-

- (a) One X Software Defined Radio with RCU or 02 X V/UHF Tx/ Rx and 01 X 100 w HF Tx/Rx with associated RCU (depending upon the equipment fit).
- (b) Two X All Wave x along with HSDM and G/MSK attachment.
- (c) One X Receiver Aerial Exchange.
- (d) One X On/Off Line Crypto System.
- (e) Two X Signal Projectors.
- (f) ACCS (for remote operation of sets) with three remote positions (one each in Bridge, Ops Room and MCO).
- (g) Lighting in MCO.

9. **Visual Signalling Equipment.**

- (a) 15 inch Signalling Projector – Two
- (b) Aldis Lantern - Two
- (c) Handheld signalling torch – Two
- (d) Flag sets and Flag Lockers- 2 sets (with provision for vertical storage of Flags)
- (e) Dressing Line - Two Sets

(f) Two sets of Anchor Flags which can be stowed along with the cable flags.

10. **Office Equipment for MCO.**

(a) Two X Office computer with latest OS, laser printer and UPS.

(b) One X Desktop optical scanner with OCR.

(c) One X Photocopier.

(d) One X Heavy Duty Shredding Machine.

(e) One X FAX machine.

(f) One X Cross-cut shredding machine.

SECTION – G**AVIATION****Operating Parameters**

1. **External Environment Limitations.** As a general rule, helicopter operations from *IV* ships along with full operational capability, are limited to ship motions not to exceed limits for helo operation specified as per extant Naval guidelines. The ship motion limits are to be maintained with adequate roll reduction devices at Sea state 5.
2. **Internal Environment Limitations - Manned Locations.** Manned spaces, excluding the Hangar, within the ship aviation facilities are to be ventilated and air conditioned to maintain an effective temperature of not more than 24° C.

Aircraft and Hangar Specifications

3. **Specifications of Aircraft.** The ship should be capable of accommodating 01 (One) Advanced Light Helicopter (ALH)/ Naval Utility Helicopter (NUH).
4. **Dimensions of Aircraft.** The under mentioned dimensions of the aircraft are to be utilised for ascertaining Hangarage and Flight Deck/ spot size requirements.
5. **Dimensions of Aircraft.**

<u>Particulars</u>	<u>ALH</u>
Max AUW	5.5 T
Length Overall	15.87 m
Length (Two Blade Fold)	15.87 m
Width	3.4 m
Height	4.91 m

Hangar

6. **General Requirements.** The purpose of the Hangar is to:-
 - (a) Provide all-weather protection for the helicopter.
 - (b) Provide a weather protected, environmentally stable shelter, within which to conduct helicopter maintenance.
 - (c) House the Landing Safety Officer's Cabin.
 - (d) Provide stowage and shelter, for stores and support equipment necessary to support helicopter maintenance.

(e) Provide a protected base of operations for the Flight Deck resource and fire fighting teams.

7. The Hangar area provides space and facilities for the maintenance of the primary aircraft structure and related systems. In accordance with prescribed maintenance schedules, components of the aircraft are removed from time to time for repair, calibration and maintenance in the Air Department's specialised maintenance support shops. Each of these shops is outfitted with the peculiar services and equipment necessary to accomplish these assigned tasks.

8. The Hangar shall protect personnel, facilities, stores, armaments, etc. contained therein in the event of a helicopter crash on deck. This requirement shall be based on a fully fuelled and armed helicopter crashing and suffering fuel tank rupture with the ensuing worst possible fuel spill and fire. The Hangar shall protect Flight Deck fire fighting personnel and allow them access to the Flight Deck without jeopardising other support facilities within the Hangar.

9. The Hangar shall protect personnel and equipment within the Hangar from the effects of a helicopter mishap on deck by preventing:-

(a) Fuel spills from entering the Hangar.

(b) Debris from a crashed helicopter penetrating the Hangar structure and Hangar door.

(c) Fire on the Flight Deck from spreading to the Hangar.

10. The Hangar shall have provision for parking, securing and servicing the aircraft movers, service carts, etc. required to support the helicopter. These items, in their stowed position, shall not reduce the clearances in the helicopter's entrance or exit path or maintenance envelope. Ship's structure, piping, ventilation and other installations shall not reduce the clearances in the helicopter's entrance path, exit path and maintenance envelope.

11. **Location.** The Hangar shall be situated directly forward of the flight deck, on the centreline of the ship and oriented in line with the centreline of the ship along its length. In order to help minimise turbulence over the Flight Deck and the detrimental effects of air wake, the superstructure containing the Hangar should be as narrow as practical.

12. **Hangar Size and Physical Characteristics.** The principal determining factor for the size of the Hangar is the dimensions of the helicopter, with its rotary wings and tail pylon folded. The Hangar should be capable of accommodating one Advanced Light Helicopter/ One Naval Utility Helicopter. Hangar clearances are to cater to the largest individual dimensions between the two.

(a) **Hangar Internal Dimensions.** When stowed, there shall be unencumbered maintenance envelopes around the helicopter, which allow all shipboard aircraft maintenance tasks to be completed. The **unencumbered** maintenance envelope within the Hangar shall have dimensions of not less than 3 metres more than the folded length of the aircraft in length (1.5 m ahead and

astern of the helicopter when stowed), not less than 2 metres more than the folded width of the aircraft in width (1 m on either side) and not less than 1 metre more than the folded height of the aircraft in height.

(b) The Hangar is used to store a significant portion of the equipment and stores for the helicopter. When the ship deploys for an extended period (2 months), the amount of items stored in the Hangar increases dramatically. Stowage of these items shall not encumber the maintenance envelopes.

13. **Additional Features.** The following additional features are to be provided within the Hangar:-

(a) **Drainage.** Flush drains shall be provided in the Hangar deck. These should be of sufficient size to drain the total volume of water discharged from the Hangar sprinkler system (fire fighting).

(b) **Ventilation.** Though the Hangar is not part of the ship's citadel, it shall be ventilated. The ventilation system shall provide fresh air to the Hangar, to act as the cooling medium during hot weather and prevent the accumulation of explosive gases within the Hangar.

(c) A suitable watertight opening/ gland to pass helicopter starting cable and helicopter fuelling hose from Hangar to helo deck.

(d) **Hangar Lighting.** Internal Hangar lighting will be provided as follows:-

(i) General purpose white lighting shall be interlocked with the Hangar door/ access. There shall be two light levels required in the Hangar, 50 lux when there is no work going on in the Hangar and 375 lux for working conditions (when measured at 1 metre above deck level).

(ii) Night adaptive lighting shall also be provided in the Hangar and controlled by an on/off switch. It shall not be interlocked with the Hangar door. Maximum intensity is to fall in the range of 2 to 5 lux when measured 1 metre above deck level controllable in intensity from zero to maximum.

(iii) Night adaptive lighting in the Hangar and anywhere else that may be visible from the exterior of the ship should be NVG friendly low level white lighting or blue/green lighting vice the "traditional" red night adaptive lighting. Lighting in and around the lift should also conform to the night adaptive and NVG compatible lighting.

(e) **Hangar Lighting Control.** Hangar lighting control should consist of:-

(i) A three position selector switch for lighting "off, white lighting "on" and night adaptive lighting "on".

(ii) A door switch installed at, and operated by, the Hangar doors.

(iii) A bypass switch for white lighting "on" to override the door switch.

(iv) The lighting in working spaces that open into the Hangar shall be controlled by door switches so that lights in the working spaces do not compromise the darkened ship setup in the Hangar. If the door of a space leads to a passageway fitted with night adaptive lighting, the space itself shall also be fitted with both normal white lighting and night adaptive lighting.

14. **Hangar Safety Requirements.** Safety of the aircraft and associated maintenance personnel shall be a principal factor in the design/modification of the Hangar area. During design/modification of the Hangar arrangements due consideration shall be afforded to the following factors:-

- (a) Freedom from personnel hazards such as protrusions, sharp edges, obstructions and similar features.
- (b) Adequacy of maintenance accessibility around the helicopter.
- (c) Provision for the safe and secure stowage of aircraft GSE related systems, and other loose items of equipment.
- (d) Safe and adequate passageways, hatches, ladders, stairways, platforms, etc. including provision for escape under emergency conditions.
- (e) Correlation between positioning of aircraft Ground Support Equipment and its related task.
- (f) Accessibility of aircraft Ground Support Equipment and related systems.
- (g) Accessibility to Flight Deck and other Air Department shops and spaces.

15. With the exception of the helicopter traversing system, no electrical equipment or permanently fitted cables shall be installed below the 500 mm level. If this is unavoidable, the equipment shall be in an explosion proof enclosure and the cable shall be laid through a lightweight steel conduit.

Hangar Door and Other Accesses

16. **Hangar Door.** A Hangar door shall be furnished at the aft face of the Hangar structure and adjacent to the flight deck. It shall provide access to the Flight Deck from the Hangar area for the helicopter. The clear unobstructed aperture of the door opening shall not be less than the following:-

- (a) Height – A/C height + 0.5 metres.
- (b) Width – A/C minimum folded width + 2 metres (1 metre clearance on each side of the helicopter).

(c) Whilst operating the Hangar door the helicopters promulgated flying clearance areas should not be impeded, so as to permit operation of the Hangar door whilst the helicopter rotors are engaged.

17. **Hangar Door Design Characteristics.** The door and its associated hardware shall be designed and installed so as to withstand without loss of serviceability, neither jamming nor binding, in environmental, sea state, and motion parameters stipulated earlier. The SOTRs for the Hangar door would be provided by IHQ MoD (N). In addition the door should meet the following criteria:-

(a) The design of the door track and related assemblies shall be such that in the event of breakage or failure, damaged parts and assemblies are prevented from falling on the aircraft.

(b) In the closed position the door must be light tight, to meet darken ship criteria, and be weather proof.

(c) The bottom of the door shall be constructed to fit the deck curvature. A weather strip shall be fitted to ensure uniform sealing across the deck connection for door lifting mechanism at the end.

(d) The deck adjacent to the door shall feature a suitable drainage system to drain sea water, rain and fuel spills away from the door. The drain system shall be covered at deck level with a suitable grating which will maintain a smooth flat contour between the Hangar deck and the flight deck. The use of projections on the deck to maintain the weather tight integrity of the mating door and deck will not be acceptable.

(e) A CCTV camera which captures the entire Flight Deck along with an adequately sized display be provided within the Hangar for the fire fighting and aviation support team to view the Flight Deck activities.

18. **Other Access.** There shall also be a general access, in addition to the main Hangar door access, between the Flight Deck and Hangar area. This access shall be used for both Air Department personnel traffic and emergency traffic. It shall be operable from both sides, open onto the flight deck, and when closed, maintain the weather tightness and fire resistance of the Hangar area. Access to the interior of the ship via an air lock from within the Hangar is also required. It shall have the following characteristics:-

(a) All doors shall be fitted with holdback hooks.

(b) Doors fitted with viewing ports are to be designed to incorporate the largest port size compatible with the strength and rigidity of the door. Where viewing ports are fitted in external doors, dead lights or other appropriate means shall be fitted to prevent light showing through.

(c) If these doors are located at the side of the Hangar, then another means e.g. port lights in the Hangar door or a CCTV monitor in the Hangar shall be provided for personnel in the Hangar to observe the Flight Deck when the Hangar door is closed.

(d) The access door to and from the Hangar to the interior of the ship should ideally open into the interior of the ship however if for some reason the door is opening into the Hangar then the maintenance envelope around the aircraft (Para 12) should not get affected.

Hangar Stowage Requirements

19. **Customised Stowage**. Customised stowage shall be provided in the Hangar area for Aircraft Maintenance and Ground Support Equipment (A/GSE). The customised stowage would be a means of attaching an item of A/GSE to the structure of the ship. The attachment means shall be self-contained, require no special tools to either attach or detach, and be operable by one man, in no more than 2 minutes. When installed in the custom stowage, the A/GSE item shall be positively secured against all motions of the ship.

20. The total list of A/GSE items can be broken into two broad categories:-

- (a) General Purpose Aircraft Support Equipment.
- (b) Particular Aircraft Support Equipment.

21. In addition to the formal A/GSE list of equipment, certain additional items of equipment shall be provided with customised stowage as follows:-

- (a) Stowage arrangement adjacent to the Hangar for not less than 8 cubic metres for cargo strops and cargo nets.
- (b) Lockers adjacent to the Hangar for the stowage of not less than 12 sets of Flight Deck personnel safety equipment.
- (c) Stowage racks for chocks, tie-down chains, lashings, loose cables, grounding poles and miscellaneous Hangar gear.

Hangar Maintenance Facilities

22. In addition to the standard Hangar facilities the following workshop facilities in the Hangar:-

- (a) Two bulkhead mounted locker with peg board system for stowing hand tools, approximately 1000 mm high by 1200 mm wide by 300 mm deep.
- (b) 06 (03 on either side) bulkheads mounted switched double electrical power outlet points distributed around the Hangar.
- (c) 02 LAN drops, distributed around the Hangar.

Helicopter Traversing System

23. **General.** The helicopter traversing system will be used to secure and manoeuvre the helicopter from the landing area to the Hangar and vice versa. The system shall be capable of safely handling the helicopter in operating conditions upto sea state 4.

24. **Design Characteristics.** The SOTRs for the rail-less winch based traversing system would be provided by IHQ of MoD (N). The fitment of sub assemblies of the system should comply with the obstruction clearance over the Flight Deck in accordance with latest naval standards. Fittings inside the Hangar should not impede the unencumbered maintenance envelope around the aircraft as enumerated at Para 12.

Handling and Securing

25. **General.** The installation of the complete traversing system along with the associated fittings will be considered as an option during Project implementation so as to be in tune with contemporary systems. However, facilities shall be provided in the Hangar and on the Flight Deck for the handling and securing of the helicopter in addition to the Harpoon deck lock system. Securing would be achieved using tie-down points on the aircraft and attaching them to the deck. The tie-down chains/lashings shall be capable of holding down the helicopter without the assistance from the Harpoon system under any conditions likely to be encountered as defined in the next paragraph on environmental limitations.

26. **Environmental Limitations.** Sufficient number of tie-down chains shall be supplied sufficient to allow the helicopter to be secured:-

- (a) On the Flight Deck up to environmental conditions specified in Para 1.
- (b) In the Hangar up to and including the ship survivability requirements as stated in Para 1.

27. **Tie-Down Locations - General.** The exact pattern and spacing of the tie-down points will be based on the specific requirements of each helicopter to be secured and the requirement to integrate the tie-downs with ship's structure. These requirements are translated to deck locations when the helicopter is in the landing position on the flight deck. In a similar way, the requirements are also translated into deck and bulkhead locations when the helicopter is in its stowed position in the Hangar. Once the tie-down fitting pattern for these two basic positions has been established, additional fittings are located in a regular grid based on the same pattern over the remainder of the Flight Deck and Hangar deck. Minor deviations from the pattern can be permitted for the purpose of mating tie-down fittings with related Flight Deck or Hangar structure provided that in the installed and pre-tensioned position no tie-down chain/ lashing shall encroach upon any part of the aircraft, or any fixed components thereof, closer than 200mm other than at the point of contact. Also, no deck tie-down fittings within the Hangar shall be closer than 500 mm to the Hangar bulkhead.

28. **Tie-Down Locations Design Characteristics.** The tie-down points on the Flight Deck shall be spaced in a pattern of squares - with each side of each square not more than 1500 mm in length - in both fore and aft and athwart ships directions symmetrically about the ship's centreline over the whole area of the Flight Deck within 500 mm inboard of the port and starboard Flight Deck edge and 500 mm forward of the after edge of the flight deck. The tie-down points in the Hangar shall be fitted 500 mm inboard from bulkheads and spaced in a pattern of squares - with each side of each square not more than 1500 mm in length - in both fore and aft and athwart ships direction over the whole area of the Hangar deck.

29. **Physical Characteristics and Installation Details.** The characteristics of the tie down fittings will be as follows:-

(a) The tie-down fittings shall be arranged and designed to hold a helicopter at its maximum All Up Weight throughout ship motions, vibrations and environmental ranges described in Para 1. The maximum computed load in any tie down would be the Safe Working Load.

(b) The tie-down point shall hold a helicopter at its maximum AUW throughout the specified ship motions, vibrations and environmental ranges. The maximum computed load in any tie-down point shall be the Safe Working Load for all tie-down points. Each tie-down point shall be designed to withstand twice the Safe Working Load without plastic deformation. The tie-down points shall be designed to withstand between two to three times the Safe Working Load without catastrophic failure.

(c) The deck tie-down points shall be of the flush deck sockets cross bar type or other contemporary type. Deck tie-down fittings shall be compatible with tie-down chains/ lashings currently in use. All deck tie-down fittings should be of the same size, arrangement and strength, similarly, all tie-downs chain/ lashings shall be of the same size, arrangement and strength.

(d) Tie-down fittings shall have a life expectancy commensurate with the ship's expected remaining life expectancy (25 years). The periodic application of a specified test load should not shorten the tie-down fitting's life.

(e) The tie-down fittings shall retain their required strength at temperatures ranging between - 40 Deg C to + 60 Deg C.

(f) Deck tie-down fittings shall not degrade helicopter landing or traversing performance nor act as a personnel hazard.

(g) The tie-down points shall be maintenance/rust free type.

30. **Test Requirements.** 100% of all tie-down fittings must be tested by a pull test of twice the Safe Working Load to verify that the tie-down fittings meet the strength requirements. Liquid Penetrant Tests shall be applied to the weld joints of all tie-downs subjected to the pull test.

Flight Deck

31. **Flight Deck Clearance Criteria.** The clearance criteria for the operation of the ALH/ NUH from ships are to be in accordance with guidelines promulgated vide relevant naval orders. Approval of IHQ MOD (N) is to be obtained prior and during design and fitment of any fittings on the Flight Deck and surrounding areas which have a direct bearing on the helicopter operations.

32. **Airwake and Flight Deck Turbulence.** Airwake and Flight Deck turbulence are critical factors for helicopter operations from ships. The ships design should be subject to Computational Fluid Dynamics (CFD) studies and wind tunnel testing to determine the wind environment around the ship that is relevant to helicopter operations. The IHQ of MoD (N) will confirm the criteria for acceptable air wake and Flight Deck turbulence that can be applied during the ship design phase. The design of the ship should reduce turbulent airflow over the Flight Deck to the maximum extent. In order to help reduce turbulent airflow over the flight deck, the ships design should:-

- (a) Avoid the placement of large objects near the after end of the Hangar on the sides and top of the Hangar superstructure.
- (b) Avoid large uninterrupted planar surfaces on the Hangar top and sides to help reduce laminar airflow around the structure.
- (c) Locate equipment/ features at the sides of the Hangar to break up the airflow.
- (d) Minimise the breadth and height of the superstructure directly forward of the flight deck. Ideally, the superstructure width directly forward of the Flight Deck should be no greater than the Hangar width at the Hangar door position and extend forward as far as the various internal areas located around the Hangar will allow.
- (e) Locate the ship's funnels and other machinery exhausts as far forward of the Flight Deck as practical. The study of exhaust gases, at a range of exhaust temperatures and velocities and ambient temperatures from 0°C to 41°C, should be analysed through Computational Fluid Dynamics (CFD) studies and wind tunnel tests.

Flight Deck Location and Size

33. **Location Criteria.** The Flight Deck should be located such that the centre of the touchdown circle is as close as practical to the point on the ship where vertical translation and acceleration due to ship's pitch is minimised. The under mentioned Flight Deck size caters for 360° operations of the ALH/ NUH (with an obstruction on one side of flight deck).

34. **Flight Deck Length.** The Flight Deck should ideally extend to the aftermost part of the ship (transom). The ship shall have a Flight Deck with a length measured from the Hangar door (aft most projection on the Hangar face) to the aftermost point

of the Flight Deck of not less than 16.5 metres. In addition to the minimum Flight Deck lengths stated above the Flight Deck should also satisfy the following:-

(a) Flight Deck length should be sufficient such that the ratio “**distance of the centre of the touchdown circle from the Hangar (A)**” to “**width of the Hangar at its after face (B)**” should be approximately **2:1 (A:B)**. If other ship level requirements affecting the ship’s general arrangements and upper deck layout make this impractical, this ratio may be reduced but under no circumstances shall be less than **1.5:1**.

(b) Flight Deck length should be sufficient such that the ratio “**distance of the centre of the touchdown circle from the Hangar**” to “**height of the Hangar at its after face**” should be not less than **2.5:1**.

35. **Flight Deck Width.** The ship shall have a Flight Deck that spans the full breadth of the deck it is situated on and have a minimum width of **9.6** meter.

Flight Deck Physical Characteristics

36. **Flight Deck Access - Aft End.** Access to and from the Flight Deck must be possible from the forward and the after end especially for fire fighting. Access at the forward end will be through or around the Hangar. Access aft will be to the quarter deck through one/ two ladders, preferably on after corners of the flight deck. The ladders shall permit:-

- (a) Pedestrian access to the Flight Deck under normal conditions.
- (b) Rapid escape from the Flight Deck in the event of an emergency.
- (c) Rapid emergency access to the Flight Deck for both fire fighting and damage control purposes.

37. **Ladder Characteristics.** Both ladders shall lead to the next lower deck to provide a suitable access route. The ladders and guardrails shall meet the requirements of obstruction clearance criteria in accordance with relevant extant naval regulations iro Flight Deck protrusions. The ladders must be of size and configuration which will serve damage control and fire fighting requirements. Ideally for an astern flight deck, there must be an open gallery or quarter deck below, for mooring equipment and for fire fighting access to the flight deck.

38. **Flight Deck Coaming.** The perimeter of the Flight Deck shall be fitted with a coaming. The coaming shall have sufficient height and strength to restrain a helicopter moving at a speed of 0.5 m/sec without damage to the coaming. The coaming shall conform to the obstruction clearance criteria. The Flight Deck coaming shall be installed such that Flight Deck drainage is not hindered.

39. **Fuel Spill Considerations.** The Flight Deck drains and scuppers must be capable of clearing a fuel spill, centred anywhere on the flight deck, in less than 2 minutes with the ship in the normal trim position. The Flight Deck would then also be capable of efficiently clearing itself of water. The Flight Deck fuel spill containment

and drainage system shall ensure that a catastrophic fuel spill on the Flight Deck will be isolated to the flight deck, rapidly removed from the flight deck. MARPOL regulations are to be followed. Drainage from the area within the Coaming is to be led through a valve designed for selective output (three way valve) either to a tank (for fuel/oil) or overboard for wash down water. The Flight Deck drainage system shall cater for the following:-

- (a) Prevent fuel from running into the Hangar with the Hangar doors closed.
- (b) Prevent fuel from running into compartments adjacent to the flight deck.
- (c) Prevent fuel from running onto the decks below the flight deck.
- (d) Prevent fuel from running down ladders or stairways leading from the flight deck.
- (e) The Flight Deck drains should be continuous from the Flight Deck to the discharge point.
- (f) Flight Deck drains should lead directly to an appropriate point near the waterline and overboard.
- (g) The drains should not be connected to any other drainage systems.
- (h) The drainage system in way of the Hangar doors shall be provided on the Flight Deck side of the doors. Fuel/ water dams shall be fitted at the Hangar door.
- (j) The Flight Deck should be cambered and will be fitted with coaming to ensure that the above requirements are met. However, any projections must not be greater than 10 mm except at the extreme deck side edge where they must not exceed 450 mm.
- (k) Fuel spills must be cleared without relying on Ship motion.
- (l) Air ventilation inlets close to the Flight Deck surface must be positioned and equipped so as to prevent the ingress of fuel during a fuel spill.

Safety Nets and Portable Safety Railing

40. **General.** The requirements of this Para reflect the specialised aviation support requirements for railings and stanchions and are in addition to those required by the ship as a whole. A system of safety nets and portable safety railing must be provided to surround the Flight Deck area. Safety nets shall be fitted on the outboard deck edges of the Flight Deck and shall extend the full length of each side and across the after end.

41. **Safety Net Stanchion Characteristics.** The safety nets shall be supported by an arrangement of hinged stanchions attached to the outboard face of the ship's side. Quick acting Helo safety net stanchions to be provided made of suitable material

so as to withstand a falling load of 150 Kg, from 1.5 m. The stanchions shall be hinged to travel outboard through an included angle of at least 85 degrees to a vertical position. In the fully vertical position, the safety nets shall extend not less than 1.5 meters above the level of the flight deck. The nets and stanchions, when in the down position, shall not protrude above the level of the flight deck. A means shall be provided to both raise and lower the safety net and stanchion assemblies and to lock stanchions in both the up and down positions; the release of locks shall not require special tools. The ship should have a powered and remotely operated system that raises and lowers the Flight Deck safety nets, section by section. Each section of the Flight Deck safety nets shall also be capable of being raised or lowered manually by one person.

Flight Deck Fittings

42. **Flight Deck Helicopter Grounding.** The ship shall have grounding points on the Flight Deck at either side of the Flight Deck operating spot. Additional grounding points shall be provided at the VERTREP positions. The grounding points shall consist of a highly electrically conductive nonferrous metal attached to the bare metal of the Flight Deck or adjacent structure.

43. **Flight Deck Surface Finish.** The ship shall have a weatherproof, fuel resistant, non-slip Flight Deck coating. The non-skid Flight Deck coating shall have a coefficient of friction between 0.6 - 1.0 μ in any condition.

44. **Harpoon Grid.** The Harpoon Grid is a system aimed at securing a helicopter to the Flight Deck immediately after touchdown by the hydraulic engagement and lock of the helicopter harpoon onto a grid set in the flight deck. The hydraulic harpoon is electro-hydraulic device remotely operated by the helicopter pilot by action on engage/release switches. On the engage mode, the harpoon jack telescopically extends vertically under the fuselage until its lower jaw engages into one of the grid holes. A pair of claws is then hydraulically closed and locked onto the grid, and the jack retracts to ensure the necessary securing tension. The honeycomb grid is a stainless steel grid machined to a honeycomb display of calibrated holes, normally flush with the flight deck. The grid characteristics are conceived to optimise the instant engagement of the harpoon jaw and the securing of the claw. The grid characteristics are to be in accordance with STANAG 1276. The location of the harpoon grid on the Flight Deck would be ratified by IHQ MoD (N) during design deliberations.

Helicopter Operational Support

45. **LSO Compartment.** A compartment is required in or adjacent to the Flight Deck where the Landing Safety Officer (LSO) can be stationed. The ship shall have a LSO compartment located, arranged, outfitted and equipped to facilitate monitoring and control of helicopter operations during all pre-flight, launch and recovery evolutions and during flight operations within visual range of the ship. The LSO compartment configuration, arrangement of consoles and location of equipment shall enable the Landing Safety Officer (LSO) to perform their duties and other functions and maintain an effective lookout over the Flight Deck and sea and sky aft of the

Hangar face. The LSO compartment is manned by one officer but may carry a second officer under training. The duties carried out by the LSO are to:-

- (a) Control and regulate all Flight Deck activities during flying stations.
- (b) Provide direction and assistance to the helicopter crew in the form of verbal and visual instructions.
- (c) Control movement of personnel on the Flight Deck during launch and recovery operations.
- (d) Control the fuelling, de-fuelling, arming and de-arming of the helicopter on the flight deck.
- (e) Operate the controls of all helo deck lights, aviation state boards, communication system (both internal and external).

46. **Location.** The LSO compartment shall be integrated into the Hangar structure. The location of the LSO compartment should be such that it provides an unobstructed direct view of:-

- (a) Helicopter approach and departure.
- (b) The Flight Deck including, Flight Deck personnel positions, fuelling/de-fuelling positions, fire-fighting positions, crash rescue positions, etc.

47. **LSO Equipment.** The LSO compartment shall be outfitted and equipped with:-

- (a) LSO workstation.
- (b) Communication systems and terminals. The communications include, basic user terminals, extended user terminals including selected command and operational networks, wire free to Flight Deck personnel, broadcast to Flight Deck and access to main Ship Broadcast, UHF and VHF radio transmit and receive, etc. Details are given in paragraphs 55 to 69.
- (c) Control and indication of Flight Deck landing aids, Flight Deck status lights, other Flight Deck lighting, helicopter crash alarm, Flight Deck AFFF monitors, other components of Flight Deck and Hangar AFFF fire fighting systems.
- (d) Light switches and controllers of all lights/communication panels are to be located in a master illumination/ communication panel within the LSO with all controls at hand (ergonomically positioned).
- (e) Fixed writing table.
- (f) One office chair.
- (g) Bulkhead mounted dry erase white board.

- (h) Bulkhead mounted notice board.
- (j) Two storage lockers of appropriate size.
- (k) Two large sized digital clocks of approximate dimensions 12" X 9".

48. **LSO Workstation Equipment.** The workstation shall be outfitted and equipped with:-

- (a) One operator's chair.
- (b) Internal and external communications facilities.
- (c) Integrated control panel for all helicopter Visual Landing Aids including Stabilized Horizontal Reference System and Advanced Stabilised Glide Slope Indicator System.
- (d) Ship-Helicopter Operating Limits (SHOL) Display System, selectable for each helicopter type.
- (e) Controls for window wiping, washing and defogging systems.
- (f) Crash on deck alarm illuminated mushroom push button with flip-type protective guard.
- (g) Emergency AVCAT fuel shut-off illuminated mushroom push button with flip-type protective guard.
- (h) Remote controls for activating/de-activating and steering the Flight Deck fire-fighting monitors.
- (j) Landing Period Designator which would indicate lateral and vertical accelerations at the centre of the touchdown circle.

49. **Location of Equipment within LSO Compartment.** The workstation consoles and associated equipment and instrumentation shall be located so as not to block the user's Field of View (FOV). The following features are to be incorporated for ergonomic outfitting:-

- (a) All communication controls shall be located within easy reach of the user.
- (b) All controls shall be positioned within the peripheral view of the LSO while he is looking out and down onto the flight deck.
- (c) Workstation consoles should be positioned so that the instrumentation and equipment they contain are mounted so as to face an operator/ user looking aft.
- (d) As far as practicable, operating surfaces should be normal to the operator's line of sight.

(e) The height of workstation consoles shall not interfere with the fields of vision defined above and in any event shall not exceed 1350 mm.

(f) The operator's chair shall be high backed, adjustable in height, rail mounted so that it can be moved fore and aft and arranged and configured to permit sitting or standing operation at the workstation.

(g) The fixed writing table and office chair shall be located forward of the operator's chair and provided with one terminal for internal communications and one LAN drop.

(h) The LSO Compartment shall have heating, ventilation and air conditioning to the same standards as other ship's conditioned spaces.

(j) Access to the LSO Compartment should be via an internal stairway (if located on 01 deck) or through the Hangar.

(k) A gastight door that opens outward from the LSO Compartment shall be provided.

(l) The LSO Compartment shall have a secondary means of escape that is separate from the main access to the LSO Compartment.

(m) The LSO Compartment shall have clear passageway of at least 700 mm width for all other personnel traffic routes. Space necessary for operating at a workstation is to be considered as part of the workstation and is not to be part of the passageway.

(n) Sufficient hand-rails or equivalent shall be fitted inside the LSO Compartment and around the workstation to enable personnel to move or stand safely in bad weather.

50. **Noise Level.** The ambient noise level on the LSO Compartment should not exceed 65 dB (A).

51. **LSO Compartment Lighting.** Internal general-purpose white lighting shall be provided in the LSO Compartment to general ship standards for compartments with exterior windows. Internal general purpose white lighting of intensity 300 lux when measured at 1 metre above deck level is required within the compartment. Night red lighting shall also be installed and be controllable in intensity by means of a rheostat from zero to full intensity. Full intensity for red lighting is to fall in the 2 to 5 lux range when measured 1 metre above deck level. LSO Compartment light is required to be NVG compatible. Emergency white lighting that comes on automatically when a power failure occurs shall **not** be fitted.

52. **Design Features of Interior Fittings.** Bulkheads, deckheads, false deckheads, linings, consoles and other major fittings in the LSO Compartment shall be provided with a suitable low reflective finish. Glare and reflections from surfaces are to be minimised.

53. **Determination of FOV.** The Field of View (FOV) from the LSO Compartment shall be determined based on the Design Eye Point (DEP) of the LSO from a seated position. The LSO DEP is defined as being located 1.50 metres above the standing deck in the LSO Compartment and 1.0 metres inboard from the LSO Compartment deck edge closest to the flight deck.

54. **LSO Compartment Windows.** The LSO Compartment windows with a view to the exterior of the ship and the associated window mullions shall be located and configured to provide a Field of View (FOV) for the LSO that meets or exceeds the following requirements:-

(a) A minimum upwards FOV angle through the after facing window of 35°, the FOV angle shall be sufficient to observe the helicopter in high hover and VERTREP operations.

(b) A minimum downward FOV angle of 60° shall be sufficient to observe the entire flight deck.

(c) A minimum lateral FOV angle of +/- 75°, the FOV angle shall be sufficient to observe the helicopter during departure and any obstructions abeam of LSO Compartment.

(d) Window mullions, internally and externally mounted equipment and other FOV obstruction shall not be located in the line of sight from the Design Eye Point (DEP) to the landing spot on the flight deck.

(e) The LSO Compartment windows, with a view, to the exterior of the ship shall be inclined from the vertical plane, with the top of the window outward, at an angle of not less than 10° and not more than 25°.

(f) The LSO Compartment windows with a view to the exterior of the ship should be as wide as possible and divisions (mullions and transoms) which separate the windows should be kept to a minimum. The divisions necessary to support and secure the windows should be as far as practical positioned clear of the line of sight.

(g) The LSO Compartment shall have a window that provides a view of as much of the interior of the Hangar as is practical.

(h) All LSO Compartment windows shall be constructed of shatterproof, hardened, armour proof safety glass having strength commensurate with the degree of exposure to storm conditions and complying with a recognised International Standard for rectangular windows.

(j) All LSO Compartment windows shall be glare, shatter, scratch and impact resistant and, except the window into the Hangar, shall have wipers.

(k) All LSO Compartment windows shall provide clear distortion-free vision. Clear sun protection film (for UV reduction) is to be fitted on the inner surface of the windows. The transparency of the film should not be less than 80%.

(l) The LSO Compartment windows, except for the windows installed overhead and the window into the Hangar shall be fitted with heavy-duty wipers with an interval function and with a washer spray nozzle for each wiper and a washing fluid reservoir with a capacity of not less than 5 litres. The reservoir should be located and accessible for ease of refilling. Each wiper and spray nozzle shall be independently controllable.

(m) The LSO Compartment windows and the window into the Hangar shall be fitted with optically clear retractable roller sunscreens which enables true colour interpretation.

(n) Suitable safe external access arrangements shall be fitted under the LSO Compartment windows to enable cleaning of windows and maintenance of the wiping and washing systems.

Helicopter Communications

55. **Voice Communication General Requirements.** The voice communication equipment required for the Air Department is to be generally identical to that supplied for the ship as a whole. This section specifies the required types of communication interconnections and locations, which shall be provided specifically for the Air Department. Voice communication can be broadly divided into internal and external communication. Internal communication can fall into four categories which are:-

- (a) Broadcast.
- (b) Intercom.
- (c) Telephone.
- (d) Helicopter Deck Communication System.

56. **Design Characteristics.** The communication system should mandatorily incorporate utilisation of one input device at each position with selectable access to any of the internal types of voice communication systems and the external system. In particular, the LSO must be capable of inputting to all systems from a common microphone (normally a (active noise cancellation headset). The additional communication requirements stated subsequently assumes that the shipboard system will permit a single input device (a headset) to serve as the input for voice broadcast, intercom, telephone, and external radio communication inputs.

Internal Voice Communication

57. **Broadcast Systems.** The two broadcast systems required are:-

- (a) The flight deck.
- (b) General broadcast.

58. **Fight Deck Broadcast.** It is assumed that the Flight Deck Broadcast will use similar equipment to the ship's general broadcast. The broadcast output for the Flight Deck Broadcast shall cover the Flight Deck and the Hangar. The output level required in the Hangar is comparable to the output level of the ships main broadcast for any large compartment. The output level on the Flight Deck and adjacent upper deck areas must be considerably higher since it is necessary to project voice communication above very high ambient noise. The sound level on the Flight Deck may be as high as 140 dB. Input to the Flight Deck Broadcast is required by the LSO in the LSO compartment.

59. **Helicopter Crash on Deck Alarm System.** The ship shall have a helicopter Crash On Deck alarm system which will confirm to the following:-

- (a) The helicopter Crash On Deck alarm shall be distinctive from other shipboard alarms.
- (b) The helicopter Crash On Deck alarm shall be manually triggered and reset.
- (c) The helicopter Crash On Deck alarm shall be activated and mutable from the LSO compartment, DCHQ and the Bridge.

60. **Intercom Systems.** The Voice Intercom System for the Air Department may be limited to the helo/ air application only or may be part of the ship's general intercom system. In any event, the technical specifications for the system shall be common to the ship's general intercom specifications. The intercommunication requirements for the Air Department are as follows:-

- (a) In addition to the intercom in between the aviation compartments the LSO shall have two way intercom to the following locations:-
 - (i) Helicopter fuelling room.
 - (ii) Bridge.
 - (iii) Operations Room.
 - (iv) POL store.
 - (v) Aircraft Maintenance Control Office (AMCO).
 - (vi) Aft DCHQ, i.e. Fire fighting stations.
 - (vii) Hangar.
 - (viii) Meteorological compartment.

61. **Telephone System.** The ship's telephone system connection for the Air Department shall be dial/ push button type and voice input shall be by means of a common input unit (headset or microphone). In addition to the intercom service Air

Department units require telephone service. All Aviation compartments are to be provided with a telephone line and instrument.

Helicopter Deck Communication System (HDCS)

62. **General.** The Helicopter Deck Communication is intended for use on the Flight Deck and compartments of helicopter carrying ships as per the system configuration defined herein. Portable sets would be used for communications on the helicopter deck and Hangar by all members of the Flight Deck Team and fixed equipment will be used in closed compartments of the ship. The equipment should be capable of hands free operation on the Flight Deck and Hangar. The set should be water resistant/marine conditions proof and needs to be tested for operation in a harsh sea environment (salt spray and high velocity winds).

63. **System Characteristics.** The SOTRs of the HDCS systems optimised for this class of ship would be provided by IHQ of MoD (N).

External Voice Communications

64. **General Requirements.** The external communication system for the Air Department is to be made up of ship's standard communication units dedicated to the Air Department. The technical requirements for the VHF, UHF and HF units required are covered in the external communications specifications for the ship. Only the outfitting requirements are covered in this section.

65. **V/UHF Units.** The LSO compartment shall be provided with two complete contemporary V/UHF Transmitter/Receivers, one for primary communication and the other for backup.

66. **HF Units.** The Air Department shall be provided with one dedicated HF Transmitter/Receiver. HF transmissions are not required simultaneously with V/UHF transmission.

67. **Remote Control.** Transmitter/Receiver remote controls comparable to those supplied for the ship's external communication system are to be provided in the LSO compartment. A common input shall be used for V/UHF, HF external communications and all internal communications at the LSO positions.

68. **Headset Feature.** The LSO shall use a split headset, one side for internal communication and one for external. Individual volume controls for each audio channel shall be provided and incorporated into the consoles. The headset should also employ active noise cancellation technology.

69. **Emergency Set.** An emergency backup V/ UHF shall be provided in the LSO position. This radio would be independent of all internal communications and with a suitable battery backup. An integral trickle charge battery pack would need to be provided.

Closed Circuit Television System (CCTV)

70. **General Requirements.** The CCTV system supporting aviation should be a component of the ship's CCTV system. Video signals from the Flight Deck and Hangar CCTV systems will be distributed throughout the ship via the ship's LAN and will be available at any monitor connected to the ship's CCTV system. The ship shall have a Flight Deck CCTV system to provide surveillance for safety in flying operations. The Flight Deck CCTV system shall provide full views of the Flight Deck and flight paths and any areas that cannot be seen directly from the LSO compartment. The Flight Deck CCTV system shall be controllable from the LSO compartment. The CCTV system is to be in sync with specifications promulgated by IHQ MoD (N).

71. **Features.** The Flight Deck CCTV system shall provide full control of the Flight Deck cameras including pan tilt and zoom where applicable. The Flight Deck CCTV system shall include at least one fixed camera and one steerable camera. The fixed camera(s) shall be sited to provide continuous coverage of the entire flight deck. The steerable camera shall have:-

- (a) Zoom capability of 10x or more.
- (b) A pan range of not less than 180 degrees with the mid-point of the pan range facing aft.
- (c) A tilt range of ± 70 degrees from the horizontal.
- (d) The cameras shall operate in colour and shall have a sensitivity of 0.0003 Lux or better with a resolution at wide angle 570 TVL or better.

72. **Camera/ Control Capabilities.** The cameras shall be capable of operating effectively during:-

- (a) Flying operations at night in low light conditions and any low light camera operation shall not degrade the performance of the NVG used by helicopter pilots.
- (b) A non-tactical situation when the Flight Deck is illuminated to level of 5 to 7 Lux.
- (c) The cameras shall be encased in environmental housings with screen wash facilities.
- (d) The cameras shall remain fully functional in temperature range of 0 degree Celsius to 55 degrees Celsius.
- (e) The cameras shall provide a stable image at all ship speeds (0-16 Kts).
- (f) Camera selection units will be provided to allow the users to select any of their connected cameras to be viewed on any monitor.

(g) The monitor(s) in the LSO compartment shall be selectable between split screen and full screen and shall allow selection of the video signal from any camera or combination of cameras.

73. **Recording System.** The CCTV system shall include a digital video and audio recording device with at least 500 Gigabytes storage to record the following:-

- (a) Video signals from all Flight Deck cameras.
- (b) Audio signals from all internal and external communications including conversation within, to and from the LSO compartment.
- (c) The audio recording element of the system shall record all the internal and external communications in such a way that the audio from each source can be isolated from all other audio signals.

74. **Hangar Camera.** The ship shall also have CCTV cameras in the Hangar to monitor activities in the Hangar with a monitor in the AMCO and bridge. A monitor showing a view of the Flight Deck shall be provided in the Hangar to aid maintenance and aviation support personnel on Flight Deck awareness. The general specifications of the CCTV shall cater for both exterior and interior lighting (Hangar door open or close). The camera should have 1TB recording capability.

Helicopter Support Services

75. **Helicopter Fuelling Functional Requirement.** The aviation fuel system shall be capable of carrying out the following functions:-

- (a) Transporting helicopter fuel from its upper deck reception point to the helicopter fuel storage tanks.
- (b) Storing helicopter fuel on board the ship.
- (c) Cleaning and conditioning helicopter fuel held on board the ship to remove water and solid contamination.
- (d) Fuelling a helicopter in the following modes:-
 - (i) While on the Flight Deck with engines shut down.
 - (ii) While on the Flight Deck with engines running.
- (e) De- fuelling a helicopter.
- (f) Transferring fuel from the storage tanks to a disembarkation point on the upper deck of the ship.

76. **Performance Requirements.** The aviation fuel system shall conform to the following requirements:-

- (a) Should be capable of taking fuel at a rate of 85 cubic metres/hr. The system shall have sufficient usable helicopter fuel storage capacity to sustain the selected helicopter for not less than 100 flying hours. Usable fuel is 90% based on 95% capacity of which 5% is non-pumpable which amounts to 25 T.
- (b) The system shall be capable of pressure fuelling a helicopter on the Flight Deck at a maximum rate of 680 to 800 litres per minute.
- (c) The system shall be capable of operation in the gravity mode, limited to 100 kPa in no- flow condition.
- (d) The system shall be capable of de-fuelling a helicopter at a rate of 120± 20 litres per minute.
- (e) Quality of fuel delivered to the aircraft shall meet the contemporary standards as promulgated by NAQAS.
- (f) The fuel filling nozzle to be provided should incorporate a digital flow meter.

Fuelling Compartments

77. **Physical Characteristics.** A compartment shall be provided to contain all the helicopter fuel pumps and conditioning equipment. This compartment shall be fitted with forced draft extractors which can be switched on/off from outside the compartment.

78. **Flight Deck Fittings.** A storage area on the Flight Deck or in the Hangar shall be provided for the helicopter fuelling hose, grounding wire and connection equipment. This storage area (fuelling cabinet) shall be as compact as possible and close to the helicopter fuelling position to allow rapid access to the fuelling hose and equipment. It shall also be positioned so that it does not interfere with helicopter operation or present a safety hazard should an emergency, such as a helicopter crash or fuel spill, occur. The fuelling cabinet should contain:-

- (a) A hose storage device.
- (b) A grounding cable reel.
- (c) A re-circulation connection, complete with protective cap.
- (d) A communication system.
- (e) Remote controls for the pumps fitted in the pump room.
- (f) Fuel cleanliness monitoring/sample point.
- (g) A flow meter.
- (h) Storage for the helicopter fuelling nozzle.

79. **Fuel Tanks.** At least two storage tanks used solely for aviation fuel shall be fitted on board the ship.

80. **Hose Assemblies.** The fuel piping system shall terminate on the Flight Deck in a 2.5 inch internal diameter hard wall hose assembly of sufficient length to attach to the aircraft fuelling connection when the aircraft is parked anywhere on the flight deck. The fuelling hose assembly shall consist of:-

- (a) A 2.5-inch nominal diameter fuelling hose.
- (b) A contemporary nominal 2.5-inch diameter pressure fuel servicing nozzle with embedded digital flow meter.
- (c) Gravity fuelling nozzle.
- (d) A static grounding reel assembly attached with the hose.
- (e) The fuelling hose shall be located in such a position so that the fuelling operations can be carried out with Hangar shutter in closed position or a suitable trap door should be provided on the face of the Hangar door.

81. **Stowage.** When not in use, the hose assembly shall be stowed in the fuelling cabinet. It shall not require disconnection or separation for stowage purposes, and shall be withdrawn from the Flight Deck by a power assisted means. To facilitate moving the hose assembly both onto and away from the Flight Deck area, suitable guides, rollers, or similar devices shall be provided to control the hose during passage through confined spaces, and around obstructions.

Fuel Conditioning Equipment

82. **Temperature Indicating Device.** A temperature indicating device shall be fitted to each fuel pump to protect against fuel being inadvertently re-circulated through the pumps pressure relief system and the fuel subsequently heating above its flash point. This temperature indicating device shall sound an audible alarm in the ship's Machinery Control Room when the fuel temperature exceeds 40 Deg C.

83. **Flow Measuring Device.** The system shall be equipped with a fuel flow measuring device. This device shall measure in litres and be capable of operating at a flow rate up to 800 litres per minute. A readout from this unit, which is capable of being zeroed, shall also be provided at helo deck in close proximity to the fuelling point and in the LSO compartment. Inline fuel quality analyser is to be included in the system.

84. **Safety Feature.** All equipment in the pump room shall be explosion proof in accordance with current regulations.

85. A hands free wireless headset shall be provided to service tank and helo deck for obstruction free and reliable communication.

Helicopter Electrical Power Services

86. **General.** This part deals with those helicopter servicing facilities which have not been covered in the earlier sections on the Flight Deck and the Hangar.

87. This section deals with the special electrical power requirements for the aircraft or for portable equipment used to service the aircraft, and may be broken down into three parts:-

- (a) Aircraft Starting/Service Power:-
 - (i) 115/200 V AC 400 Hz 3 phase 4-wire
 - (ii) 28 V DC, 10KW, ripple not more than 1V.
- (b) Ship's Service Power – 380/440 V AC 60 Hz 3 phase.
- (c) Secondary Ship's Service Power – 115/200V AC 60 Hz 1 phase.

88. Power for ship's husbandry, lighting and permanently fitted aircraft equipment such as the traversing system is not covered in this section. Power requirements in aircraft workshops have been covered subsequently.

89. **115/200 V AC 400 HZ 3 Phase 4- Wire Aircraft Starting/Service Power.** Conversion units within the ship are to supply this power in accordance with current military/civil standards and distribute it to the Flight Deck and the Hangar to:-

- (a) A single receptacle mounted 50 cm above deck level on the forward Hangar bulkhead for the Hangar service.
- (b) An interior/exterior door is to be used to pass the power supply cable through to the flight deck.

90. **Specifications.** For a ship which normally carries one helicopter, the 400 Hz starting/service system must be capable of delivering to the Hangar and Flight Deck receptacles (separately and combined):-

- (a) Continuous rating 50 KVA.
- (b) 150% overload rating for two minutes.
- (c) 200% overload rating for five seconds.
- (d) Line drop limits in accordance with current standards.
- (e) The line drop limits indicated above are to include the output cable assembly which is plugged into the aircraft servicing receptacles.

91. **Flight Deck Output Cable.** A four wire Flight Deck Output Cable assembly shall be provided on the Flight Deck with one end suitably terminated for the Flight Deck 400 Hz power receptacle and the other end terminated in an aircraft plug

assembly in accordance with NATO STANAG 7073. The length of the free cable shall be sufficient to extend from the Flight Deck receptacle box to the extreme after end of the Flight Deck plus 1.5 metres. The conductors in the assembly are to be suitably sized to meet the loading and line drop limits indicated above. The cable shall feature an automatic power-kill capability when it is disconnected at the aircraft end. The AC and DC power output boxes with power supply indications should be provided in a weather proof receptacle at a suitable location on the helo deck so as to provide external power supply to the aircraft with Hangar shutter in closed position or a suitable trap door shall be provided to extend the power supply from Hangar to the helicopter on deck.

92. **Safety/ Interlock System.** The 400 Hz power control and safety/interlock system shall:-

- (a) Include a switch and "external power on" indicator light.
- (b) Interface with aircraft ground monitoring and control in accordance with MIL-PRF- 24021K.

(Ref:- MIL-STD-704F, Aircraft Electric Power Characteristics, for AC and DC normal operating characteristics, and MIL-PRF-24021K – Performance Specifications for Electrical Power Monitors External, Aircraft.)

93. **28V DC General.** The AC/DC conversion unit, if required by the helicopter, shall be proven suitable for its intended purpose, and feature safety and electrical protection devices in accordance with standard shipboard electrical practice. It should also:-

- (a) Be portable by one man.
- (b) Include a DC output cable of adequate length, rated to meet load and voltage drop requirements indicated above, and terminating in NATO plug assembly.
- (c) Have a customised stowage in the Hangar area.
- (d) Feature/ means to secure it to the Hangar/ Flight Deck at all given times.

94. **440 V AC 60 HZ Ship's Service Power.** Ships service power is to be distributed to a single receptacle, 1.5 metres above deck level in a readily accessible spot on either port or starboard side of the Hangar. The receptacle shall conform to the requirements of Electrical Design and Construction standards.

95. **115 V AC 60 HZ Secondary Ship's Service Power.** The 115 V AC, 1 phase, 60 Hz power should be terminated in four in number standard 3pin, grounded duplex receptacles. Those receptacles are to be equally spaced two to each side of the Hangar. They should be installed no less than 1.5 metres above deck level, and be fully accessible. Each receptacle is to be rated at 5 and 15 amps. Dependent upon specific equipment requirements, additional outlets may be fitted throughout the Hangar.

Compressed Air and Nitrogen Requirements

96. **Compressed Air.** A compressed air system branched from the ship's primary HP air system shall be provided with a delivery pressure of 21,000 kPa. One terminal outlet point is to be fitted on either the port or starboard Hangar bulkhead. The following components should be assembled on a suitable panel to form a low pressure air delivery station:-

- (a) Isolation valve.
- (b) Replacement cartridge air filter.
- (c) Pressure regulator.
- (d) The system shall be sized to supply approximately 600 litres of compressed air at a pressure 21,000 kPa.

97. **Nitrogen.** One nitrogen outlet shall be provided at the approximate midpoint of the Hangar on the opposite side from the compressed air outlet; one high pressure delivery to 21,000 kPa and one low pressure delivery to 2,500 kPa. The outlets may be from a central ship system or from a bottle bank. The following components should be assembled on a panel:-

- (a) Booster pump to produce 21,000 kPa.
- (b) Isolation valve.
- (c) Upstream pressure indicating gauge.
- (d) Pressure regulators, 0-21,000 kPa range.
- (e) Low/high pressure gauge.
- (f) Automatic pressure limiting valve (set at 2,500 kPa).
- (g) Outlet shutoff valve.
- (h) Screwed outlet connection.
- (j) Two 20-metre delivery hose for use with compressed air /nitrogen.

98. **Delivery Hoses.** Provision shall be made to store the 20 metre delivery hoses in a neat and simple manner. The quality of nitrogen provided should be in accordance with contemporary International standards. If a bottle bank is used then racks should be provided in the Hangar for two cylinders with stowage for two backup cylinders elsewhere in the ship.

Fresh Water Wash Down System

99. **General.** A fresh water wash down system shall be supplied to assist in the control of corrosion of the aircraft resulting from the prolonged exposure to salt laden atmosphere.

100. **Specifications.** There shall be a fresh water outlet located within the Hangar at the after end. The outlet shall terminate in a manual stop valve complete with a male screwed outlet port capable accepting a 1 inch female screwed fitting. Water flow from the nozzle should be approx 45 litres/min \pm 2 litres/ min against a nozzle delivery pressure of 400 kPa \pm 20 kPa.

101. **Delivery Requirements.** It is recommended approach that a separate dedicated fresh water pump with suction to the ship's fresh water tank be provided. The control for the pump should be placed in the LSO compartment.

Helicopter Maintenance and Support

102. **General.** The Hangar area provides space and facilities for the maintenance of primary aircraft structure and related systems. In accordance with prescribed maintenance schedules components of the aircraft are removed from time to time for repair, calibration and maintenance in specialised Air Department workshops, which are part of the Hangar. Each of these shops is to be provided and outfitted to accomplish a particular maintenance task. These compartments, are independent of the Hangar but which are required for the satisfactory function of the Air Department, are as follows:-

- (a) Aircraft Maintenance and Control Organisation (AMCO).
- (b) Aircraft Engineering Workshop.
- (c) Aviation storerooms (AC).
- (d) POL Store room.
- (e) Aviation Briefing Room.
- (f) Stowage for air armament and ammunition to be catered for in ships magazine.

103. **Ground Support Equipment.** The list of Ground Support Equipment to be provided would be provided by IHQ of MoD (N)/ DASE.

104. **General Specifications.** The detailed specifications and design of each compartment/ room would be ratified by IHQ MoD (N)/DNAS. These general requirements will apply to all compartments:-

- (a) The Hangar is the centre of aircraft maintenance activity. The Flight Deck is the centre of aircraft operations activity. With some minor exceptions compartments of the Air Department complex shall be positioned in close

proximity to each other with ready access to the Hangar and then to the flight deck.

(b) Normally, ship's personnel traffic should not be routed through Air Department spaces.

(c) The Air Department complex shall include safe and adequate passage ways, hatches, ladders, stairways and platforms as required for passage of personnel, equipment and stores quickly and safely. All compartments must include provisions for escape under emergency conditions.

(d) Since all the compartments except the POL store, are within the gas-tight citadel it would be advantageous, if all air department compartments can open onto a common passageway through regular doors with the passageway, having access to the Hangar through a gas-tight door.

(e) Securing arrangement for all furnishings within various compartments, within storage lockers, equipment, hinged doors, hatches shall be provided as per ships general standards.

(f) There shall be provision of ready use lockers in the Hangar for:-

(i) Avionics LRU's Line Replacement Units.

(ii) Ready use POL requirements.

Aircraft Maintenance Control Organisation

105. **General.** This article states the requirement for an Aircraft Maintenance Control Organisation (AMCO), and describes the facilities and features required to manage helicopter maintenance and support.

106. **Compartment Specifications.** An AMCO compartment shall be provided. This room provides the Aircraft Maintenance Supervisor with administrative facilities for control and documentation of shipboard helicopter maintenance and servicing procedures.

107. **Siting and Access.** The AMCO is the centre of aircraft maintenance management activity and shall have ready access to maintenance spaces. The AMCO shall be located very close to and preferably on the same deck as the Aircraft engineering and electrical/ avionics workshop and Hangar. If the common deck requirement for the above compartments cannot be met, they should not be separated by more than one deck level. Access to the AMCO shall be provided through a standard door that should not be located in the Hangar bulkhead.

108. **Services.** The AMCO shall be within the ship's gas-tight citadel and as such, is to be air conditioned and ventilated to ship's general standards.

109. **Lighting.** AMCO lighting shall conform to the requirements stipulated for white office lighting (200 to 500 lux measured 1 metre above deck level). One desk lamp shall be provided at each writing desk.

110. **Communication.** Communications are required from the AMCO to all aviation compartments and Hangar.

111. **Electrical Points.** Four 230 V AC 50 Hz 15/5 Amp duplex grounded wall receptacles shall be provided in the AMCO.

112. **Furnishings.** The AMCO is to be fitted out with the following furnishings:-

(a) Two single pedestal metal desks, with chairs, having top surfaces approximately 1200 mm long and 900 mm wide, and two record filing drawers.

(b) Four lockable four-drawer standard legal size filing cabinets.

(c) Two Shelves for publications and related books, about 3 metres in length.

(d) Two bulkhead mounted clock.

(e) A bulkhead mounted aircraft serviceability state board approximately 900 mm long and 600 mm high is to be mounted at a convenient height, and be readily accessible. It shall feature a clear transparent plastic overlay face, and be suitable for whiteboard marking. A bulkhead mounted notice board at least 600 mm wide by 400 mm high.

113. **Size Requirement.** Sufficient space is to be provided for two occupants and the furnishings described above. The space provisions shall include adequate passage around seated occupants to enable access by other personnel to the documents stowage and filing cabinets.

Aircraft Engineering Workshop

114. **Purpose.** A compartment designated the Air Engineering Workshop, forming part of the Air Department shall be provided near the Hangar. It shall provide facilities to carry out first level and limited second level maintenance.

115. **Furnishings Specifications.** The Air Engineering Workshop is to be furnished as follows:-

(a) A bulkhead mounted all metal general-purpose deep washing sink with hot and cold fresh water taps, and drainage, is to be provided.

(b) A fixed workbench approximately 1.8 metres in length, and fitted with a high quality 150 mm jaw, swivel based mechanics vice. The workbench is to incorporate drawer units with simple safety catches to restrain the drawers in the open or closed position.

- (c) Two (02) two-door metal cabinet approximately 1000 mm high by 900 mm wide by 600 mm deep and containing four adjustable shelves, for ready use parts and publication storage.
- (d) Two secured workbench stools for maintenance personnel with facility of chair stowage.
- (e) A bulkhead mounted hinged table suitable for working on maintenance documentation (approximately 1500 mm long and 900 mm wide, permanently installed at a folded down height of between 950 mm and 1000 mm. The table shall be securely lockable in both the 'up' and 'down' positions. Two folding metal chairs with facility of chair stowage.
- (f) A cleaning materials locker approximately 300 mm wide by 300 mm deep by 600 mm high.
- (g) An aircraft equipment stowage locker approximately 1500 mm wide by 750 mm deep by 1800 mm high, with fittings necessary for the hanging of clothes and stowage of spares.
- (h) A rack of stowage locker, incorporating suitable hooks and a shelf unit adequate for the stowage of heavy clothing.
- (j) Two points each for domestic supply and 200V 400 Hz 3 phase supply.
- (k) HP/ LP air facility for servicing of aircraft tyres, operation of pneumatic riveting guns and paint spray guns.

116. **Size Requirement.** Sufficient space shall be provided for four occupants and the furnishings and services listed above. The space provisions shall include adequate passage around seated occupants to enable other personnel access to stowage's and documentation.

Aviation Store Room

117. **Purpose.** A compartment or compartments are required to store those aviation support spares, test equipment, assemblies which are necessary sustain the helicopter and its related systems for a period of 90 days, with a helicopter Utilisation Rate of 60 hours.

118. **Siting and Access.** The Aviation Storeroom shall be as centrally located within the Air Department complex as is practical. The store room may be provided as two separate compartments; one within the Air Department complex, and one located elsewhere within the after portion of the ship. It is essential that at least 60% of the required store's volume be within the Air Department complex. In addition to the general compartment considerations outlined at the outset of this section, the storeroom siting must take into account the handling problems associated with transfer of stores between alongside and storeroom and from there to Hangars or workshops. Access to the storeroom(s) shall be by means of regular doors and/or hatches from within the structure of the ship. The Aviation Storeroom shall be within

the ship's gas-tight citadel and as such is to be air conditioned and ventilated to ship's general standards.

119. **Lighting.** White lighting to ship storeroom standards (200 to 500 lux measured 1 metre above deck level) shall be provided in the storeroom(s).

120. **Furnishings.** The Aviation Storeroom shall be of sufficient size for the fitting of four in number cabinets, 1.5 metres high by 0.75 metres wide by 0.7 metres deep. In addition to the cabinet stowage area, 4 cubic metres of bulk stowage is required. Bulk stowage shall include provisions such as battens and tie-downs for securing stores. Each Aviation Storeroom is to be supplied with one metal step-up stool about 450 mm in height, with rubber padded feet. A secure stowage shall be provided for the stool when not in use.

121. **Size Requirements.** Aviation Storeroom shall be of sufficient size to accommodate the furnishings described above and ensure that ready access is provided to all items. The dimensions of the largest item to be stored are to be taken as 1 metre by 0.5 metre by 0.5 metre. Passage allowances shall be adequate to facilitate handling of such an object by two persons.

Petroleum, Oil and Lubricants (POL) Stores

122. **Purpose.** A compartment shall be provided to store aviation POL sufficient to support one helicopter for at least 100 hours of flying.

123. **Sitting and Access.** The helicopter POL storeroom shall be provided as part of the Air Department complex preferably adjacent to the Hangar and on the same deck. If this location is not feasible, the POL storeroom should be no more than one deck away from the Hangar. The sitting must take into count the handling of 200 litre drums from alongside to the POL storeroom. The air change and explosion proof lighting requirements of the POL storerooms are the same as for the Hangar. Accordingly the POL storeroom may take priority in Hangar deck sitting over the workshops and the aviation storeroom. A gas-tight door is to be provided to the POL storeroom whether it opens into the Hangar or to an Air Department passageway.

124. **Fire Hazard.** The helicopter POL storeroom is not normally within the citadel and is classified as a hazardous area. Fire fighting services shall meet the standard ship's requirements for such areas. The helicopter POL storeroom is classified as a Class B hazard and as such shall have fire detection and extinguishing installation meeting or exceeding the standard ship's requirements for such locations.

125. **Environment Control.** Adequate cooling and ventilation shall be provided to ensure that POL storeroom temperature is maintained less than 24 Deg C under all conditions with a 4 minute forced rate of exhaust air change (Hangar requirement).

126. **Lighting.** Lighting provided is to be by flameproof assemblies with externally operated control switches in accordance with standard ship's safety requirements for such compartments. The illumination level shall be to the ship's standard for storerooms (200 to 500 lux measured 1 metre above deck level).

127. **Furnishings.** A rack unit shall be provided complete with suitable dividers capable of storing 100 standard one litre containers. At the deck level below the rack space provision should be made for the stowage of at least one 20 litre capacity pail, one 15 capacity drum and two 25 litre drums. The shelves of the rack unit should be fitted with 'Save All' trays to comply with standard safety requirements. An all metal locker unit shall be provided. The locker shall contain at least three (03) adjustable shelves suitable for storage of miscellaneous oils, cleaning fluids, rust inhibiting fluids and light grease containers. The rack and locker units are the ready use POL lockers covered in Hangar requirements. If the POL storeroom is adjacent to the Hangar and on the same deck, these units need only to be provided in the POL store and shall be deleted from the Hangar services. Space is to be provided within the POL storeroom for one 200 litre drum with restraining devices.

128. **Size Requirement.** The POL storeroom shall be of sufficient size to accommodate the furnishings outlined above with sufficient working area to permit manhandling of 200 litre drums into position. It is estimated that an area of 4 square metres will meet this requirement.

Aviation Briefing Room (ABR)

129. **Purpose.** A compartment designated as the Aviation Briefing Room shall be provided in the vicinity of the Hangar. It is to provide facilities to enable the flight crews to be briefed prior to a flying mission, act as a flight gear storage and changing room and also be used for Air Department training.

130. **Siting and Access.** The Aviation Briefing Room shall be located near the Hangar and preferably on the same deck. In the event of a space conflict between the Aviation Briefing Room and the three maintenance rooms (AMCO, Air Engineering workshop, and Avionics workshop), the maintenance rooms are to take precedence. The Aviation Briefing Room shall not be separated by more than one deck from the Hangar. The Aviation Briefing Room door may lead directly to the Hangar or into an Air Department passageway. If the door is a Hangar door, it must be gas-tight; otherwise a non gas-tight door may be used. The ABR shall be within the ship's gas-tight citadel and as such is to be air conditioned and ventilated to ship's general standards.

131. **Lighting.** The Aviation Briefing Room is to be provided with normal ship's office standard white lighting (300 lux measured 1 metre above deck level). The compartment shall also be fitted with variable intensity red lighting (0 minimum to 2 to 5 lux maximum measured 1 metre above deck level). If the Aviation Briefing Room does not exit directly to the Hangar, the route from the Aviation Briefing Room to the Hangar shall also be equipped with a fixed level (to be up to 35 lux) red lighting for aircrew transit to the Flight Deck and shall be NVG compatible.

132. **Communication.** Communications from the Aviation Briefing Room to the Operations Room, Bridge, LSO, AMCO and Meteorological facilities are to be provided. A command control system utilising selectable information displays is to be fitted in the Aviation Briefing Room.

133. **Rest Room.** If toilet facilities are not available within two decks, bulkheads of the Aviation Briefing Room then a toilet should be provided adjacent to the Aviation Briefing Room.

134. **Furnishing Specifications.** The Aviation Briefing Room will be furnished as follows:-

(a) The Aviation Briefing Room shall be provided with individual lockers for each air crewmember. The lockers are to hold flight clothing and flight gear such as immersion suits, helmets, flight boots, lifejackets and navigation logs. As a minimum each locker is to be provided with a shelf and is to be approximately 1.8 metres high by 0.8 metres wide by 0.5 metres deep. Six such lockers are required. Two lockers (dimensions of each approximately 1.8m high, 1.6m wide and 1 m deep) adjacent to lockers specified are also to be provided for Survival Equipment.

(b) The ABR should be suitably furnished to accommodate at least six personnel to conduct pre-flight briefing.

(c) Stowage for charts and publications shall be provided. The stowage shall securely retain the charts and publications and must be easily accessible. The storage dimensions shall be approximately 1 metre by 1 metre by 0.3 metres high.

(d) The Aviation Briefing Room is to have a large electronic display completely covering the bulkhead facing the fixed chairs. The board shall have two sliding panels which can cover the electronic screen and can be used as blackboards. Minimum required dimensions are 2 metres wide by 1.2 metres high.

(e) The Aviation Briefing Room is to have a foldable/ collapsible desk with chairs with top surface approximately 1.2 m long and 0.6m wide.

135. **Size Requirements.** The Aviation Briefing Room shall be sized large enough to accommodate all the furnishings and services outlined above and permit convenient movement around them. A clear area no less than 6 square metres is to be provided adjacent to the flight clothing lockers to act as a changing area.

Flight and Visual Landing Aids

136. **General.** This section deals with flight and visual landing aids on the ships, so as to assist the helicopter in its mission. These include:-

(a) Meteorological Facilities.

(b) Flight Deck Markings.

(c) NVG compatible (Stage 3) Flight Deck Operational Lighting and external ships lighting.

137. **Meteorological Facilities.** A typical meteorological system shall provide the following information at the meteorological office and for distribution to the Air Department and other users throughout the ship:-

- (a) Relative and true wind speed.
- (b) Relative and true wind direction.

138. **Wind Speed Detection Subsystem.** The wind direction/speed detection subsystem shall be fitted to automatically provide the wind direction and speed information relative to the ship. Two detector units are normally required; they shall be mounted on the mast in such a manner that for any wind direction, one of them shall be free of all obstructions. The wind system should meet the following performance requirements:-

- (a) Wind Direction as follows:-
 - (i) Range - 0 to 360 degrees.
 - (ii) Accuracy - ± 2 degrees for wind speed greater than 5 knots.
 - (iii) Response - critically damped with a follow-up rate of not less than 8 ± 1.5 degrees per second.
 - (iv) Sensitivity - when wind vane is displaced 8 degrees from a 5 knot wind position, it shall, upon release, return to the original position within ± 2 degrees.
 - (v) Resolution - 0.5 degrees.
- (b) Wind Speed as follows:-
 - (i) Range - 1 to 100 knots.
 - (ii) Accuracy - ± 1 knot for wind speed of 1 to 60 knots/ ± 2.5 knots for wind speed of 60 to 100 knots.
 - (iii) Sensitivity - maximum starting speed of 0.5 knots.
 - (iv) Resolution - 0.2 knots.

139. **Bridge/ LSO Compartment Meteorological Display.** Relative wind direction and speed; and ship course and speed data shall be transmitted and displayed in the LSO's compartment. All meteorological information shall be made available to the Bridge and Operations Room.

Flight Deck Marking

140. Flight Deck markings are to be based upon the intersection of the pilot's eye line and the athwart ships line for all ships. For the first ship of the class, only the

centreline marking and the deck number is to be painted on the flight deck. During ground trials/SHOL the final markings of the Flight Deck would be promulgated in accordance with relevant naval standards.

Flight Deck Operational Lighting

141. **General.** This section establishes the functional requirements for Flight Deck Operational Lighting to permit safe day, night, and reduced visibility operations. All operational lighting for helicopter as well as ships general lighting must be Stage 3 NVG compatible STANAG 1445 or higher specifications. The lights are to be in accordance with current NATO / DEF STAN 05-21 and should also cater for reduced RCS. The Helicopter Visual Landing aids listed below should preferably be procured as a comprehensive package from one vendor so as to enable ease of integration and standardisation. The vendor details/ detailed system requirements as per SOTRs would be provided by IHQ MoD (N)/ DEE. Flight Deck operational lighting should have controllable intensity and may include all or part of the following dependent upon specific requirements:-

- (a) Hangar top floodlights.
- (b) Hangar face floodlights.
- (c) Flight Deck maintenance floodlight.
- (d) General Flight Deck illumination.
- (e) Bar type Centre line lights.
- (f) Flight Deck status lights.
- (g) Bar type Forward limit line lights (athwart ship).
- (h) Stabilised Horizon reference system lighting.
- (j) VERTREP lighting. NATO STANAG 1162
- (k) Bar type Line up and extended line up lights.
- (l) Homing beacon lights.
- (m) Obstruction lights.
- (n) Bar type Corner lights on Hangar face and silhouette (Aft flight deck).
- (p) Deck wash lights.
- (q) Wave off lights.
- (r) Boundary lights.

- (s) Advanced Stabilised Glide Slope Indicator (ASGSI).
- (t) Bar type Deck periphery lights.
- (u) Landing period designator with NVG compatible displays for pilot interpretation.

142. **Controls and Indicators.** A master illumination control panel or console shall be fitted in the LSO Compartment in such a way that the LSO can view the Flight Deck with controls at hand. The control of all lights should be through a single touch screen operator control display with adequate redundancy for operating any of the lights independently. The lights should be programmable for different illumination levels with facility to store programmed combinations.

Stabilised Horizon Reference System (SHRS)

143. **Functional Requirements.** The LED based, NVG compatible SHRS shall provide a horizon reference that maintains its position parallel to the true horizon regardless of the ship's rolling and pitching. A visual display shall be provided in the same plane of vision as seen by the helicopter pilot during his normal obstruction clearance scan when performing the landing approach and recovery operation. A pitch and roll display along with controls shall be provided in the LSO Compartment. The SHRS is to comply with STANAG 1445 for NVG requirements. The system should have an inbuilt fault warning light which is visible to the pilot.

144. **Dimmer.** A Dimmer Control shall be provided for the horizon bar, with each dimmer control incorporating a light, which shall indicate the bar illumination intensity. A Dimmer Control shall be provided for each horizon bar fault warning light.

Advanced Stabilised Glide Slope Indicator

145. The minimum standard requirements for the nomenclature, light characteristics, vertical beam spread, beam elevation, horizontal beam spread, intensity, intensity balance, intensity control, stabilisation and installation of glide slope indicators used in helicopter operations is enumerated in the subsequent paragraphs. The ASGSI shall be of YGR type. The specifications are to comply with NATO STANAG 1236 Edition 2 and STANAG 1445 stage 3 and US NAVAIR standards on Glide Slope Indicator. The specifications for the same will be provided by IHQ of MoD (N).

146. **Landing Period Designator (LPD).** The LPD should indicate the energy in the helicopter deck. It will indicate the real time visual indication to the pilot optimum time to take-off and land safely. The master control for the LPD will be located in the bridge with a repeater in the LSO compartment. An independent NVG compatible LPD display at a suitable location on the helicopter deck superstructure will be provided to indicate the deck status to the pilot at aircraft hover height above the deck.

Fire Fighting and DC Requirements

147. **General**. The requirements related to the helicopter are to be integrated into the requirements of the ship as a whole, in terms of organization, equipment and personnel. The ship's damage control system is to be organised so that a Damage Control Headquarters controls the activities of the section base entrusted with the responsibility of DC and FF requirements of Air Department. The aviation fire fighting arrangements are to be in accordance with the current ***IN*** fire fighting standards. The fire fighting facilities are to be available in the Hangar also.

Inspections and Trials During and After Build

148. **General**. Aviation facilities in ships under construction will be inspected by a board convened by respective Commands on directives from IHQ MoD (N)/ DNAS. The following planned inspections will be carried out:-

(a) **Line-Out**. On completion of bare compartments and on approval of compartment layout drawings inspection by DNAS/ Reps would be undertaken along with approved ship/ class drawings.

(b) **Progress**. At approximately 60 to 80% completion or 8 to 10 weeks before planned final inspection. Fitting-out is to be complete with the exception of fixture painting, Flight and Hangar Deck finishes, Flight Deck safety nets and attractive items.

(c) **Prior Delivery**. An aviation facility evaluation team comprising of Aircrew, RAQAS rep and technical officers would evaluate the aviation facilities at least three months prior to the planned delivery of the ship. All observation brought out during the evaluation would be ratified by IHQ of MoD (N)/ DNAS prior implementation. The board is to be ordered by DNAS on indication from DND/ DSP/ DOH.

(d) **Final**. The final inspection will be carried out on completion of the aviation arrangements in those areas and compartments having a major function in the aviation role. All support systems are to have been completed, tested and certificated and all systems, with the exception of the aircraft fuelling system, are to be working. An IHQ MoD (N)/ DNAS representative will normally be in attendance during the final inspection and aviation pre-HAT may be carried out concurrently. Final Inspections should be completed before the aviation HAT commences.

149. **Harbour Acceptance Trials (HAT)**. The HAT is to be conducted by a board of Officers from the Command, to confirm that the ship's aviation facilities function correctly and that the ship is capable of receiving an aircraft. Ships are to signal requests for aviation HAT to Commands (CAVO) well in advance. During the trial the following would be checked:-

(a) Completion of all outstanding work.

(b) Operational readiness of the ship's aviation facilities (associated test certificates are to be produced).

- (c) Embarkation of, or demand progression for, all stores, test equipment, ground equipment and other portable and mobile equipment required for aviation purposes.
- (d) Test certificates for all aviation related systems, including those on which no work has been conducted will be examined.
- (e) An Air Engineering and RAQAS representative from the Command will carry out a pre-HAT after ship acceptance.

150. **Sea Acceptance Trial (SAT)**. The SAT is conducted by trials team comprising of test pilots and the members of the board convened by Command. The Command aviation Organisation is to confirm that the ship is in all respects ready to receive an aircraft and that the aviation facilities function correctly under operational conditions at sea. A satisfactory fuel clearance signal must have been received from CATO before the trial can commence. Ships are not to operate aircraft from the Flight Deck until successful completion of aviation SAT. The trial must be carried out in sheltered waters, at anchor or at a buoy, but can also be conducted alongside providing the wind is favourable. The trial comprises two parts:-

- (a) **Part 1 - Flying**. The aircraft will carry out an airborne check of the Glide Path Indicator (GPI) alignment in accordance with approved guidelines which will be monitored by the staff who will make any necessary adjustments. For this check the aircraft will be required to maintain a constant range approximately 500 yards astern of the ship (normal aircraft control facilities are to be provided). Refuelling of helicopter may be required.
- (b) **Part 2 - Deck**. The aircraft is to land on completion of the GPI alignment and shut down. For ships with a Hangar, the helicopter rotor blades will be folded and the aircraft moved into and back out of the Hangar. The following are checked during the trial:-
 - (i) Material aspects of aircraft launch, recovery and deck handling.
 - (ii) Hangar clearances.
 - (iii) Satisfactory operation of all basic aircraft turn-round and servicing facilities including fuel, air, hydraulics, electrical power, winches, intercom, radio, helicopter deck communication system.
 - (iv) Ships are to signal requests for aviation SATs to Commands.
 - (v) Ships without a dedicated flight or ships whose flight aircraft is unavailable should signal Commands, requesting for:-
 - (aa) Aircraft coverage during the proposed trial.
 - (ab) Personnel and equipment for aircraft movements.

151. **First-of-Class Flying Trial**. This trial only affects first-of-class ships and will normally be carried out immediately after the aviation SATs. The trials would be

convened by the Command in consultation with HQNA and IHQ MoD (N)/DNAS. These are carried out in order to measure:-

(a) The dynamic forces and accelerations induced in the undercarriage during landing and take-off.

(b) The control margins while operating under a wide variety of conditions. The trials may last for upto 6 weeks depending on the numbers of unknown variables. The objects of the trial are:-

(i) To carry out sufficient launches and recoveries in varying conditions of ship motion, relative wind and aircraft relative headings to establish safe operating conditions by day and night.

(ii) To issue a Ship Helicopter Operating Limitation (SHOL) for the ship and particular type of helicopter to be operated

SECTION – H**SEAMANSHIP**

1. **Towing Arrangements.** The ship should be capable of towing another vessel of the same size. Complete arrangements for towing aft and being towed forward are to be provided.
2. **RAS Arrangements.** RAS arrangement is required to be provided as per Def Stan 07-279, Def Stan 22-90 and Def Stan 22-92.
 - (a) The ship should be designed for light jackstay arrangement on the 01 deck for replenishment (Starboard and Port) and fuelling (Starboard and Port) using QRC and NATO Standard Probe receiver type fuelling gear.
 - (b) Ship to be provided gear to receive LSHSD from astern fuelling rig of tankers and supply ship.
3. **Davits.** Single fall and hook type Davits are to be fitted as per extant Naval standards. Davits are to be provided to lift stores including light combat equipment as follows:-
 - (a) Single-arm davits for RIBs.
 - (b) Three portable davits of 250 kg SWL.
 - (c) One centreline crane telescopic/ retractable with a minimum outreach of 5m beyond the ship side. The Safe Working Load (SWL) of the centreline crane for lowering and hoisting of SMB's should be atleast 10 tonnes at maximum outreach.
 - (d) One telescopic crane, capable of lifting 3 tons and with an arm length extending 5 m beyond the ship side, for lifting MUV.
 - (e) **Oceanographic Davit.** One oceanographic davit and winch with 10,000m cable of 250 kg SWL for conduct of oceanographic observations.
4. **Awnings.** Two sets of lightweight PVC coated fabric awnings as per modern merchant marine standards for all weather deck spaces and two sets of ceremonial awnings for the helo deck (one when the Hangar is fully retracted and the second when the Hangar is fully extended) are to be provided.
5. **Covers.** Two sets of lightweight canvas covers are to be provided for each weather deck fitting as well as for all ship's vehicles.
6. **Brow/ Gangway.** Two brows and Gangways each are to be provided near the Gangway positions, forward and aft. The brows and gangways are to be broad enough to facilitate two-way movement of personnel and smooth transfer of stores.

7. **Accommodation Ladders.** Electrically operated accommodation ladder one each, on port and starboard forward, are to be fitted. Accommodation ladders to be fitted in accordance with IMO/ SOLAS regulations.

8. **Anchors and Berthing.** Two bower anchors AC 14 and 10 shackles of chain cables on each anchor, are to be fitted on foxle. Complete mooring and berthing arrangements including windlass (two forward) and capstan (one aft) and cable devices are to be provided. Windlass arrangement for hoisting/lowering of anchors is to be provided. Anchor chain cables and accessories should be in accordance with extant naval guidelines. Anchor and its arrangement are to be as per the Classification Society rules.

9. **Boats.** The following boats are to be carried by the ship:-

(a) Two Survey Motor Boats (SMBs) of approx length 11.0 m and two SMBs of approx. Length 9.0 m. All four SMBs to be hoisted by a suitably located Centreline Crane with a provision of stowage on the deck. The specifications of SMB should be as per the broad specifications.

(b) Two 7.0m RHIB with separate single arm davit for hoisting/ lowering. Davit shall be provided with automatic quick release hook as per latest *SOLAS* requirements as laid down in MSC 81(70) and applicable LSA code. RHIBs should have appropriate communication equipment. The specifications for 7.0 m RIB should be as per latest naval regulations.

(c) Two Gemini crafts with wooden chocks for stowage.

(d) Two OBM tanks for stowage/cleaning of OBMs.

(e) RHIBs are to be capable of being hoisted and lowered whilst underway.

(f) RHIBs to be re-configurable for LIMO role with provision for fitting LMG.

(g) RHIBs are to be provided with monsoon gear covers, which can be used even when the boats are on the davits.

10. **Life Saving Equipment.** Life saving appliances is to comply with latest IHQ MoD(Navy) policy in vogue.

(a) General Service Life Jackets for 155% of total strength of personnel onboard to be provided as per scale. Additionally, 75 Hazardous Duty Life Jackets to be provided as per IHQ of MoD(N) policy.

(b) 20 men life rafts catering to 110% complement. Life rafts along with salient features like HRG and weak link, should be as per MSC 48 (66) and 81(70) and applicable LSA code.

(c) Life buoys, meeting SOLAS requirements to be provided as per scale.

(d) Scrambling nets are to be fitted on both port and starboard sides.

(e) MoB light and smoke markers to be provided with lifebuoys as follows:-

- (i) One on forecastle.
- (ii) One each on port and stbd side of bridge wings.
- (iii) One each on port and stbd side boat deck and midships.
- (iv) One each on either side of quarter deck.
- (v) 03 spares.

(f) Swimmer of the watch recovering rig with all accessories iaw para 06023 of BR 67/2009 (Admiralty Manual of Seamanship).

11. **Deck**. All weather decks are to be non-skid (as per latest IHQ of MoD(N)specifications).

12. **Automation**. Extensive automation is to be ensured for ship's husbandry and maintenance functions. Hull husbandry tools/equipment to be provided as per scale.

13. Seamanship and safety equipment as per *INV* policy in vogue.

SECTION – J**ACCOMMODATION**

1. **Accommodation.** Latest design concept for the vessel, with respect to Ergonomics/ functional aspects and crew comfort are to be adopted. Sound insulation is to be provided to all accommodation, work spaces etc. Modern modular accommodation spaces need to be provided in the ship iaw latest *IV* policy letter.

2. **Officers.**

(a) Single cabin suite, with day and night cabin for CO.

(b) Grade 3 single cabins for EXO, Trg Cdr, EO, LO, Flt Cdr, MO, SHS and LOGO with a foldable second berth for hospital ship requirements.

(c) Five x twin berth cabins.

(d) Two x Junior Officers Mess (JOM) for ten Under Trainee (U/T) Officers (05 berths each).

(e) Two x twin berth cabins for women officers with attached bath and toilet

3. **Sailors.**

(a) Two x 10 berth mess for MCPOs and CPOs.

(b) One x 10-berth mess for Senior Sailors (ERAs).

(c) Two x 16-berth mess for Senior Sailors (POs).

(d) Six messes for Junior Sailors (four messes of berth capacity 30 men and two messes of berth capacity 27 men).

(e) One x Two Bunk Cabin for Regulating Staff.

(f) One x 30 berth mess for U/T sailors

4. **Air Conditioning.** The ship is to be fully air conditioned for tropical conditions as given in Def Stan 02-102, Issue-3.

5. **Ward Room.** The Officers' Ward Room is to consist of a dining area, lounge and attached pantry. The lounge area is to be fitted with bar counter, 56" LED television, digital CD player (capable of playing Blue Ray Discs/ DVD/ MP3/ Audio CD/ VCD) music system and COTS Home Theater System. A bottle cooler, tea/ coffee vending machine and two fixed electric fly/ insect killer are also to be provided. Provision for seated dining for 10 officers is to be provided in the dining area. The pantry is to be equipped with one refrigerator of 500 ltr capacity, water cooler with RO plant/ water purifier, microwave oven, dishwasher, adequate food warmers and

commercial ice making machine. Sea securing arrangements are to be provided for all items. The latest commercially available items at the time of commissioning are to be supplied. Adequate working space should be catered in the Pantry for Stewards. The Ward Room is also to be fitted for to operate as the Emergency Operation Theatre.

6. **Gun Room.** This would serve as dining and recreation area of Junior U/T officers when embarked. All facilities similar to Ward Room mentioned at para 5 above must be included commensurate to the size capable of accommodating 10 officers.

7. **Recreation and Messing.**

(a) One Senior Sailors' Dining Hall with a seating capacity of atleast 30 is to be provided. The dining hall is to be provided with one fixed electric fly/ insect killer, 01 refrigerator, 42" LED television, a home theater system, one water cooler with RO plant/ water purifier, one heavy duty toaster, microwave oven.

(b) One Junior Sailors Dining Hall with seating capacity for at least 60 personnel and one under trainees dining hall with seating capacity for atleast 20 personnel is to be provided. The dining halls is to be provided with two fixed electric fly/ insect killer, 01 refrigerator, 42" LED television, a home theater system, two water cooler with RO plant/ water purifier, three heavy duty toasters, microwave oven.

(c) One Gyro stabilised Satellite Dish TV is to be provided with reception available at least 250 nm seaward from Indian coast. Independent connections are to be provided for all accommodation spaces and messes. The subscription is to be catered for at least five years from the date of commissioning.

8. **Domestic Arrangements.**

(a) **Pantry.** A pantry is to be attached to the Captain's Cabin, Ward Room, Gun Room and each Dining hall. The pantries should have refrigerators, microwave oven, dish washing machines, food warmers and racks for keeping daily use rations, cutlery, crockery and utensils with adequate space for movement of stewards.

(b) **Galley.** Separate Galleys are to be provided for officers and sailors. The galleys are to be co-located to the respective dining halls. State of the art in kitchen automation is to be provisioned while designing the Galleys. Adequate stowage space and arrangements are to be provided to keep crockery and cooked food in utensils for serving. Indicative list of Galley equipment for Officer and Sailor's galleys are placed at **Annexure 'B'** and **Annexure 'C'** respectively. The galleys are to have the following facilities:-

(i) **RU Cool Compartment.** The ship's galley should have a ready use Cool Room and Vertical Deep Freezers to store a week provisions to meet the immediate requirements. This facility will be in addition to Cold/ Cool rooms being provided to store 30 days provisions.

(ii) **Bakery.** The galley should have a well equipped bakery with Ovens, kneading machines and other modern equipment to bake Indian and Western breads and confectionery.

(iii) **Food Distribution Counter(s) with arrangement for Food Warming.** Adequate food distribution points with Bain Marie and drinking water storage facilities are to be catered for to enable smooth distribution of food to the personnel. Food/ water distribution points are to be in close proximity of assembly area. Cold and hot water dispensers are to be provided with industrial capacity RO water filters

(iv) Heavy duty dish washer.

(v) High power exhausts system.

(vi) All the doors providing access to the galley should have Inspection Windows for assessment of the galley area from outside in case of fire.

(c) **Scullery.** Adequate and suitable area of minimum 100 sq ft with plumbing, drainage and water proof impact resistant tiles is to be provided in the galley. A raised boundary of one foot is to be provided to prevent spillage of water due to roll of the ship. The garbage disposal unit is to be co-located to the area. Overhead water storage tanks of 1000 Ltrs capacity are to be provided in the sculleries.

(d) **Scullery in Dining Halls.** Both the Senior and Junior Sailors Dining Hall are to have an attached scullery with a Heavy Duty Automatic Dish Washing Machine for washing utensils of the sailors, especially during Action Messing.

(e) **Toilets.** 'Vacuum Toilet System' is to be provided on the vessel. Separate toilet facilities are to be provided for Captain, officers, senior and junior sailors. In addition, attached toilets to be provided with women officers cabins.

(f) **Bathrooms.** Separate bathrooms for Captain, officers, senior and junior sailors are to be provided. In addition, attached bathrooms to be provided with women officers cabins.

(g) **Laundry.** A Ship's Laundry with heavy-duty washing and drying machines is to be provided. The capacity for laundry machine and drier should be atleast 40 kg each located in the laundry compartment. This could be further customised to accommodate light (10 kg) and heavy (30 kg) loads depending on availability of space. A separate COTS washing machine and drier of atleast 5 kg capacity should be provided for women officers co-located with their accommodation.

(h) **Canteen.** A canteen is to be provided to scale, with rack stowage for canteen stores. A bottle cooler for soft drinks and a refrigerator are to be fitted in the canteen.

(j) **Library.** The Junior Sailor's Dining Hall is to be fitted with racks/ library cupboards for 500 library books and a provision of at least 1000 CDs/ DVDs. This may be combined with 'Information Room'.

(k) **Gymnasium.** Provision of at least two state-of-art gym/ exercise rooms is to be provided. The gymnasiums are to be fitted with a 10-station multi trainer and other portable exercise equipment for officers and sailors including heavy-duty treadmills.

9. **Offices.** Offices as mentioned against each are to be provided:-

- (a) Ship's Office.
- (b) Gunnery Office.
- (c) Store Office.
- (d) Main Signal Office.
- (e) Engineer's Office.
- (f) Electrical Office.
- (g) EMR/Central Cable TV.
- (h) CB and BR office with Safe, racks and cupboards for stowage of BRs.
- (j) Regulating Office.
- (k) Wardroom Mess Office.
- (l) Training Office.

10. **Provision of State Boards.** The following boards are also to be provided: -

- (a) Gangway State Board.
- (b) Officers' State Board
- (c) Gangway Met instrument Board.

11. **Insulation.** The insulation for the following is to be as per relevant extant orders:-

- (a) Thermal insulation
- (b) Acoustic Insulation
- (c) Cold Insulation

12. **Access.**

- (a) Access plan is to confirm to extant *IV* regulations.
- (b) Ladders should be so located that they facilitate easy closing of doors and hatches.
- (c) The removal routes of machinery and parts should be such that they avoid removal of other equipment. Portable openings in the deck overhead are to be provided for removal of machinery, as necessary.
- (d) The access plan is to be approved by classification society. Approved drawings are to be submitted to Integrated Headquarters MoD (Navy), for final approval.
- (e) All openings below the V-Line should have water tight closures.
- (f) No opening is to be provided in W/T bulkhead below the damage control deck.

13. **Guardrails and Stanchions.** Guardrails and stanchions are to be provided as per extant naval standards as applicable.

Annexure B
(Refers to Para 8 (b) of Section 'J')

LIST OF GALLEY EQUIPMENT – OFFICER'S GALLEY

Ser	Equipment	Capacity	Qty
1	Hot case	Small size 80 Kgs	03
2	Juicer	5 Ltrs	02
3	Electric Kettle	1 Ltr	03
4	Garbage Disposal unit as per IMO/ MARPOL	20-50 Kgs	02
5	Toaster Bread	12 Slice	03
6	Microwave Oven	30 Ltrs Industrial	02
7	Refrigerator	300 Ltrs	01
		400 Ltrs	01
8	Baking Oven	20-30 Kgs	02
9	Deep Fat Fryer	10 Ltrs	01
		15 Ltrs	01
10	Ice Cube making machine	15 Kgs	01
11	Wet Grinder	5 Kgs	01
		20 Kgs	01
12	Idly Making Machine	100 idlis/ hr	01
13	Bakers table	6' x 2.5' x 3'	01
14	Cocktail Station for Wardroom	Customised	01
15	Juice Extractor	05 Ltrs	01
16	Masala Grinder	05 Kgs	01
17	Food Processor/ Ingredient	10 Kgs	02
18	Potato Peeler	25 kgs	01
19	Coffee Vending machine	100 cups/ hr	02
20	Ice Cream Making Machine	20-50 Ltrs/ Kgs	02
21	Preparation Table	6' x 2.5' x 3'	02
22	Work Counter	6' x 2.5' x 4'	01
23	Rice Boiler Electric	20-40 Ltrs	01
24	Onion/ Potato Slicing Machine	20 Kgs	01
25	Vacuum Cleaner	10 Kgs	02
26	Ultrasonic Rat Repellent	Commercial	05
27	Electric Food Warmer (food distribution counter)	8 cont x 15 Ltrs	02
28	Knife Sharpener	Electric Operated	02
29	Floor Cleaning Machine	Customised	02
30	Veg Cutting Machine	30 Kgs/ Hr	02
31	Egg Beater Mechanical	Customised	01
32	Steam Cooking Vessels	05 Kgs/ Ltrs	03
		20 Kgs/ Ltrs	03
33	Meat Mincing Machine Mechanical	10 Kgs/Hr	01
34	Vegetable Mincing Machine	15 Kgs	01
35	Mixer Grinder	10 Kgs	02
36	Deep Freezer	500 Ltrs	02
37	Water Boiler	20 Ltrs	02

Ser	Equipment	Capacity	Qty
38	Single Hot Plate	Customised	04
39	Dish Washer	Medium	01
40	Sandwich Maker	Medium	02
41	Vegetable Cutting Board	4' x 2.5' x 3'	01
42	Vegetable Chiller	185 Ltrs	01
43	Electric Griller	Customised	02
44	Electric Tandoor	Standard	02
45	Pesto-O-Flash	Standard	05
46	Pop Corn Maker	Standard	01
47	Zero Oil Fryer	Standard	01
48	Water Dispenser	20 Ltrs	02
49	Bottle Cooler	360 Ltrs	01
50	Food Warmer with Wax Container & Stand (Set of 08)	--	05

Annexure C

(Refers to Para 8 (b) of Section 'J')

LIST OF GALLEY EQUIPMENT – SHIP'S GALLEY

Ser	Equipment	Capacity	Qty
1	Garbage Disposal unit as per IMO/ MARPOL	100 Kgs	01
2	Toaster Bread three racks	12 Slice	06
3	Microwave Oven	20 Ltrs	03
4	Chapati Making Machine	1200 Chapatis/ Hr	01
5	Refrigerator	210 Ltrs	03
6	Baking Oven	20-30 Kgs	03
7	Dough Kneading Machine	20-30 Kgs	02
8	Deep Fat Fryer	15 Ltrs	03
9	Wet Grinder	10 Kgs	01
10	Idly Making Machine	500 idlis/ hr	02
11	Bakers table	8' x 2.5' x 4'	03
12	Masala Grinder	Customised	02
13	Food Processor	30 Kgs	02
14	Potato Peeler	25 kgs	02
15	Coffee Vending machine	300 cups/ hr	02
16	Ice Cream Making Machine	10-15 Ltrs/ Kgs	01
17	Preparation Table	6' x 2.5' x 3'	02
18	Work Counter	6' x 2.5' x 3'	03
19	Rice Boiler Electric	20 Ltrs	03
20	Onion/ Potato Slicing Machine	10 Kgs	02
21	Vacuum Cleaner	10 to 25 Kgs	03
22	Ultrasonic Rat Repellent	Commercial	10
23	Food Warmer (food distribution counter)	8 cont x 15 Ltrs	03
24	Knife Sharpener	Electric Operated	03
25	Automatic Dosa Making Machine	300 Dosas/ Hr	01
26	Floor Cleaning Machine	50 Yards/ Hr	03
27	Veg Cutting Machine	20 Kgs/ Hr	02
28	Egg Beater Mechanical	100 Eggs	03
29	Steam Cooking Vessels	Customised	03
30	Meat Mincing Machine Mechanical	20 Kgs/Hr	02
31	Mixer Grinder	10 Kgs	03
32	Sandwich Maker	Commercial	03
33	Vegetable Cutting Board	4' x 2.5' x 3'	09
34	Electric Griller	Customised	03
35	Electric Tandoor	Standard	03
36	Pesto-O-Flash	Standard	06
37	Pop Corn Maker	Standard	03
38	Zero Oil Fryer	Standard	03
39	Water Dispenser	20 Ltrs	03
40	Deep Freezer	500 Ltrs	02
41	Single Hot Plate	Customised	09

SECTION K**LOGISTICS**

1. **Accounting.** The ship will be a Self-Accounting ship.
2. **Logistics Management.** Maximum automation is to be incorporated in peacetime and Op-logistics management. Facilities for full exploitation of ILMS/SLMS and other contemporary logistics management systems as part of OPLIMIS are to be provided. All requisite details of equipment, OBS and B&D spares are to be provided on magnetic media in the structure and format compatible with INCAT format. All necessary ship's documentation, such as SFD, List of Portable Fittings, Spare Gear, Equipment Schedules and D 787 are also to be in conformity with the INCAT format. In addition, 'NATO Stock Numbers' (NSNs) in respect of all items/ spares must also be provided wherever available. Image/ photo capture of each and every item provided onboard as well as OBS and B&D spares must also be catered for along with digitization of all documents, drawings, PILs, D-787 etc.
3. **Fuel and Lubricants.**
 - (a) Fuel and lubricants adequate to achieve endurance as indicated in Section A is to be carried.
 - (b) Aviation fuel storage of 35 tons is to be provided. Use of Nitrogen or other suitable gas is to be made to avoid/ reduce the risk of fire/ explosion. Nitrogen generating system based on fibre membrane separation technology is to be provided for the AVCAT storage tank.
4. **Stores.** Following stores with adequate cupboards and light duty racks are required to be provided to enable the ship to carry its own stores as per scale:-

Sr	Description (Store Rooms)	Qty	Remarks
(a)	Naval Store	01	
(b)	Clothing Store	01	
(c)	Dry/Tinned Provision Store	01	
(d)	Atta Store	01	
(e)	Ghee Store	01	
(f)	Mess Traps	01	
(g)	Bagged Provision Store	01	
(h)	Stationery Store	01	
(j)	Air Store	01	
(k)	Wine Store	01	
(l)	Spare Gear Store (MandS)	01	
(m)	Galley RU Stores	02	One each near officers and sailors galley
(n)	Ward Room Store	01	
(p)	Onion/ Potato Store (preferably on upper deck)	01	

Sr	Description (Store Rooms)	Qty	Remarks
(q)	Paint Store	01	
(r)	Gunner's Store	01	
(s)	Diving Store	01	
(t)	Boatswain Store	01	
(u)	NBCD Store	01	
(v)	Shipwright Store	01	
(w)	Electrical Store	01	
(x)	Engineering Store	01	
(y)	Medical Store	01	
(z)	Baggage Compartment	01	
(aa)	Training Store	01	

5. **Hair Salon.** An air-conditioned hair salon with three cushion push back chairs, mirrors and modular cupboard is to be provided.

6. **Cloth Mender.** A separate enclosure for stitching/ mend uniform/ clothes is required to be provided with three motorized sewing machines and adequate stowage racks.

7. **Refrigeration.** Cold and Cool Rooms are to be provided to carry poultry, mutton, and fresh vegetables, fruits and milk products and provisions for own use as well as for transfer to other ships.

Ser	Storage	Qty	Capacity
Cold room			
(a)	Mutton and Chicken	01	2.0 Tons
(b)	Fish	01	0.5 Tons
Cool Room			
(a)	Fruits	01	3.5 Tons
(b)	Vegetables	01	4.5 Tons
(c)	Eggs	01	2.0 Tons
(d)	Bread and Milk	01	7.0 Tons
Deep Freezer			
(a)	Galley RU Stores	03	300 kg

8. **Victualling Stores.** The victualling stores should be fitted with racks for stowage and sea securing of the provisions. The following victualling stores as per the capacities tabulated below are to be provided with proper ventilation and rat proofing:-

Ser	Storage	Qty	Remarks
(a)	Bulk Bagged Provision Store Room	01	4480 Cu Ft
(b)	Atta Store	01	720 Cu Ft
(c)	Oil/ Ghee Store	01	720 Cu Ft
(d)	Tinned provision Store	01	960 Cu Ft
(e)	Onion/ Potato Store	01	720 Cu Ft

9. **Elevators.**

(a) At least one food elevator is recommended to be provided for each galley to transfer provisions from stores to galley.

(b) A similar arrangement is to be provided for transfer of stores from the embarkation point to the store rooms.

10. **Vehicles.** The following mechanical transport is to be provided to the ship:-

(a) One x MUV air-conditioned in passenger configuration. The MUV should be with minimum capacity 7 seater and 120 BHP.

(b) One x 52 Seater air-conditioned bus (for field visits and education tours).

(c) One x MUV air-conditioned with open trailer. The MUV should be with minimum capacity 7 seater and 120 BHP.

(d) Two x scooters/ bikes (minimum 100cc and above).

(e) Three x Listers for movement of stores within dockyard (minimum power of 3.5 HP).

(f) Three MHE.

(g) Three stackers.

(h) Two sets of covers for all vehicles.

(j) Seven bicycles.

(k) Two pallet trolleys for handling heavy cargo onboard.

11. **Office Equipment.**

(a) Two x Fax Machines.

(b) Ten x Paper Shredding machines.

(c) Two Methodex calculators.

(d) 20 Scientific Calculators.

12. **Safe Chests.** Chest safes as per scale and regulations in force are to be provided in officers cabins and offices as follows: -

(a) Money chest within almirah in each officer's cabin.

(b) Safe Chests in Captain's cabin (3ft x 2 ft x 2ft), XO's cabin (3ft x 2 ft x 2ft) and LOGO's cabin (4ft x 3 ft x 3ft).

- (c) Safe Chests in CB Office.
- (d) Safe chest in MSO.
- (e) Money chest in the Ship's canteen.
- (f) Safe Chest in Ship's office for stowage of accountable documents like travel forms.
- (g) Safe chest in Pay office for cash.
- (h) Safe chest in Store Office.
- (j) Money chest within the almirah in each officer's cabin.

13. **Naval Store.** All Naval Stores as per authorization for a self accounting Survey Training Vessel, along with storage as required is to be provided. Separate storage facilities are to be provided for all the stores, spares and ammunition carried onboard. Stores lifts are to be provided with a safe working load of one ton for shifting stores from lower decks.

14. **Air Store.** All Air Stores as per authorization for a Flight operating Survey Training Vessel, along with required storage space are to be provided. Separate storage facilities are to be provided for all the Air Stores, spares and air ammunition carried onboard.

15. **Internal Configuration of Store Rooms.** All cold, cool and store rooms are to be fitted with heavy duty racking systems to enhance stowage capacity within these store rooms.

16. Stores should have direct shortest route to galley. Elevators may be provided for transfer of rations to galley.

SECTION – L**ENGINEERING**

1. **Main Propulsion.** The Propulsion System should consist of a twin shaft arrangement with one medium speed diesel engine per shaft driving a Fixed Pitch Propeller (FPP) through a Reversible Reduction Gearbox. The maximum speed of the vessel is to be achieved at 85% of the Maximum Continuous Rating (MCR) of the diesel engines. The propulsion machinery is to be designed to meet the specified operating profile of the ship as specified in the SRs. The Engines must meet the latest International norms for exhaust emission and personnel safety (IMO / MARPOL regulations). Auxiliary Propulsion consisting of Stern thrusters and Bow/ tunnel Thrusters are to be provided to cater for prolonged slow speed operation of the vessel (0-6 knots) to avoid under loading of main diesel engines and enable better manoeuvrability.
2. **Auxiliary Propulsion.** Auxiliary propulsion consisting of Stern thrusters is to be provided to cater for prolonged slow speed operation of the vessel to avoid underloading of main diesel engines and enable better manoeuvrability. Bow thrusters to be provided as per requirement.
3. **Operability under Power Outage.** The design should cater for independent availability and operability of major equipment under conditions of power outage
4. **Noise Vibration and Shock.** Selection of all machinery will be carefully considered with a view of minimizing airborne noise, structure borne noise and vibration, thereby improving habitability.
5. **Shock Standards.** Following equipment will meet Shock standards as per NSS II:-
 - (a) Main Engines
 - (b) Diesel Generators
 - (c) Fire Pumps
 - (d) Bilge Pumps
 - (e) Bilge and Ballast pumps
 - (f) Steering gear
 - (g) Stern gear
 - (h) F.O. purifiers
 - (j) L.O. Purifiers

- (k) Gear Box
- (l) Air Compressors
- (m) Air Conditioning Plants
- (n) Refrigeration Plants
- (p) Salvage Pumps

6. **Propulsion Diesel Engines.** Two four-stroke, non-reversible and turbocharged, propulsion marine diesel engines each developing requisite power under specified environmental conditions for the vessel. The diesel engines should be medium speed engine and meet the latest International norms on exhaust emission and personnel safety (IMO/MARPOL regulations on exhaust emissions) being put into force w.e.f. 2010.

7. **Reduction Gear Box.** Two marine reduction reversible gearboxes, each gearbox will drive each propeller with a ratio of reduction to match the propeller requirement. The propulsion reduction gear will be suitable for the shafting arrangement.

8. **Shafting/ Stern Gear.** Suitable shafting will be designed and manufactured to meet the requirement of the vessel.

9. **Propellers.** The vessel will be equipped with two Propellers of material NAB. The propeller design is to ensure that no 'singing' phenomenon of propellers occurs. Further, there should be no cavitations throughout the range of operation.

10. **Steering Gear.** Two (2) electro-hydraulic with VME 64 controls and power units capable of generating required torque to be provided.

11. **Stabilisers.** For reduction of rolling motion of the ship when running at higher speed a Stabiliser System is to be provided. The stabiliser control system is to be VME 64 based open architectural type.

12. **Main Diesel Generator Sets.** The vessels are to be provided with main diesel generator sets of adequate power and providing 100% redundancy. The DG sets are to be provided with an electronic governor. The diesel engines should meet the latest International norms on exhaust emission and personnel safety (IMO/MARPOL regulations on exhaust emissions). DG sets are to cater for operation of stern thrusters.

13. **Emergency DG Set.** Emergency DG set should cater for starting current of all equipment one after the other and is to be provided with battery starting as well as compressed air starting arrangements. In addition to navigation and communication equipment, EDG should provide supply to following equipment:-

- (a) Steering Gear (one steering pump)

- (b) Fire Pump (one number)
- (c) Main propulsion control system
- (d) Navais and communication equipment
- (e) IPMS (in addition to battery backup)
- (f) Lighting
- (g) APMS (in addition to battery backup)
- (h) Salvage pump (fixed/ portable)
- (j) HP air compressor (one number)

14. **Main Air Compressors.** Two electrical driven oil-cooled high pressure air compressors are to be provided as per ship's requirement to supply compressed air to the compressed air system that will cater for starting the main propulsion engines. An emergency diesel driven compressor of suitable capacity and pressure to be provided.

15. **Centrifugal Pumps.** Centrifugal Pumps for various applications as suggested below are to be provided (indicative list):-

- (a) Fire pumps
- (b) Emergency fire pump
- (c) Bilge pump
- (d) Bilge and Ballast Pump
- (e) Domestic FW transfer pump
- (f) Portable fire fighting (also mentioned in CNAL)
- (g) Salvage pump.

16. **Rotary Pumps.** Rotary Pumps for various applications as suggested below are to be provided. The list is indicative in nature and should comply with Class Rules.

- (a) FO Transfer Pump
- (b) LO Transfer Pump
- (c) AVCAT Transfer and Service Pump

17. **Oily Water Separator.** At least Two (02) Oily Water Separators, IMO compliant and of adequate capacity and reputed make are to be provided to purify bilge water oil contamination and discharge overboard meeting the latest MEPC requirements.

18. **Lub Oil Purifiers.** Two nos. automated self cleaning type centrifugal lub oil purifiers of suitable capacity are to be provided *for* purification of lub oil.
19. **Fuel Oil Purifiers.** Two nos. automated self cleaning type centrifugal fuel oil purifiers of suitable capacity are to be provided.
20. **Reverse Osmosis Plant.** Two RO Plants of 30 Tons per day (TPD) capacity are to be provided.
21. **Pressure (Hydrophore) Tank.** Pressure tank(s) (hydrophore tank) of adequate capacities are to be provided to pressurize the fresh water system. The system will be provided with auto cut-in/cut-out of fresh water pumps.
22. **Fresh Water Calorifier.** Hot water requirements for accommodation will be supplied from at least two hot water Calorifier.
23. **Air Conditioning Plants.** AC plants to cater for required load plus 100% reserve capacity are to be provided comprising of screw type compressors, chillers and condensers, using R-134a refrigerant, to cater for the ships' air conditioning requirement.
24. **Refrigeration System.** The refrigerating system will be composed of at least two (2) separate refrigerating plants operating with refrigerant R-134a. The refrigerant plants to be provided with 100% reserve capacity.
25. **Integrated Platform Management System (IPMS).** The Integrated Platform Management System (IPMS) shall be dual redundant Gigabit Ethernet Network, distributed architecture system (VME 64 standard) covering the ship machinery and systems. APMS should be suitably interfaced with IPMS. The purpose of the integrated system shall be to provide control and monitoring of the Propulsion Machinery, Power Generation and Distribution, Auxiliary Machinery, and Damage Control (NBCD) machinery and systems through corresponding sub-systems as mentioned below:-
 - (a) Integrated Machinery Control System (IMCS).
 - (b) Independent Automated Power Management System (APMS).
 - (c) Auxiliary Control System (ACS).
 - (d) Battle Damage Control System (BDCS).
 - (e) CCTV System.
 - (f) EHM module (including vibration trend monitoring).
 - (g) OBTS.
 - (h) IBS.

26. **Cathodic Protection System.** An **anti-corrosive** as well as **anti-fouling protection** system is to be provided for underwater inlets/ discharges and connected systems.
27. **Hand Pumps.** Semi-rotary hand pumps for various applications such as FO transfer pump, LO transfer pump, AVCAT pump etc. are to be provided.
28. **Portable Oil Transfer Pump.** Two electric motor driven 20 TPH capacity portable oil transfer pump (COTS) with 50 m length, 50 mm NB flexible pipe are to be provided.
29. **Propulsion System Integration.** A PSI study must be undertaken with a detailed report covering all aspects of propulsion system integration for meeting the envisaged role of the vessel, the same to be submitted to IHQ of MoD (N) for approval prior to selection of propulsion system components. It is essential that a central guiding and co-ordinating agency in the form of a PSI consultant be employed who would not only assess the propulsion requirements of the vessel and formulate technical requirements, guidelines and trial documents for Main Engine, Gear Box and Stern Gear but also co-ordinate between these equipment/ IPMS vendors towards ensuring performance of the propulsion system till such time the ship is delivered to the Navy.
30. The primary aim of the tasks and services to be undertaken by PSI shall be to Design, Integrate and Commission the propulsion system (including all associated auxiliaries and systems) to meet the specified/ desired performance, objectives. The PSI will therefore be responsible for all aspects related to Design, Integrate and commissioning of the propulsion system.
31. **Damage Control Aspects.** The main propulsion and auxiliaries are preferably to be fitted in at least two separate WT compartments to maintain the watertight integrity of the ship in event of damage to one of the compartments.
32. **Documentation.** Engineering documentation, upto fourth (dockyard/ repair agency) level of maintenance, for main and auxiliary machinery is to be provided in IETM Class 4/ CALS format, in addition to hard copy
33. **MARPOL Compliance.** Adequate provision should be made for pollution control, including sewage treatment plants, waste disposal at sea, incinerator etc, to conform to IMO standards of pollution control.
34. **Engineering Spare Gear Store.** Engineering Spare Gear Store consistent with the store requirement of the ship is to be catered for. The Engineering Spare Gear Store should have modular storage arrangement with pull out type commercial lockers, on the lines of filing cabinets, of varying sizes with locking arrangement for storage of engineering spares.
35. **Engineering Workshop.** An engineering workshop with requisite machine tools and equipment is to be provided.
36. **Fresh Water Capacity.** The ship is to be provided with a fresh water carrying capacity of at least 300 tons.

37. **Shipping/ Unshipping.** The Shipping/ Unshipping route of each machinery and system to be clearly marked and should not affect ship structure.

38. **Miscellaneous.**

- (a) All bilges to be easily accessible and should be illuminated.
- (b) The design of the ship is to ensure adequate maintenance envelope for all equipment upto major overhaul.
- (c) Suitable number of deck reception points for chilled water, firemain, fuel, AVCAT, POLs etc., to be provided.

39. **Test/ Productivity Improvement Equivalent and Inspection Tools.** The following engineering test/ productivity improvement and inspection tools should be provided:-

- (a) Cut section models for main and auxiliary equipment/ systems.
- (b) Interactive videos for minor/ major routines, including link up with PIL.
- (c) Instrumentation calibration kits for pressure, temperature, speed, level and flow applications including stroboscope and non contact tachometers.
- (d) Multifunction generators, calibrators and multi-meters.
- (e) Air-Conditioning and Refrigeration gas detection and extraction kits.
- (f) Portable hydraulic system flushing kits.
- (g) Ultrasonic Filter cleaning kit.
- (h) Thermal Imaging Cameras with software for IT defect analysis.
- (j) Universal gasket cutting and pipe bending machine.
- (k) Universal valve repair kits and bearing extractors.
- (l) Advanced portable welding and brazing equipments.
- (m) Shore based IPMS Simulator (for INS Shivaji).

40. **Effect of List/ Roll/ Pitch on Machinery.** Unless otherwise specified all machinery including integral and associated fluid system are to be capable of efficient operations when listed 20 degrees to either side. Equipment on which reliance is placed for salvage duties including generators, pumps etc. are to be capable of efficient operation upto 30 degrees list (fire/ salvage pumps upto 45 degrees roll) on either side.

SECTION – M**ELECTRICAL**

1. Entire electrical system/ equipment/ machinery is to conform to Classification Society Rules as applicable to Naval ships.
2. All electrical equipment shall be suitable for continuous operation when fitted at any direction up to an angle of 30 Deg from the vertical plane passing through the centreline of the equipment.

General Power Supply Requirements.

3. Following types of main power supplies with quality as per Classification Society Rules are to be used:-

- (a) **Main Supply.** 415 V AC, 50 Hz, 3 Phase, 3 wire with floating neutral
- (b) **Lighting Supply.** 230 V AC, 50 Hz, 1 Phase
- (c) **Domestic/Portable Equipment.** 230 V AC, 50 Hz, 1 Ph supply derived from 415V, 3 Ph, 4 wire system (obtained through secondary star connected transformer) - with earthing of neutral to ship's hull- along with ELCB and DPDT MCB for domestic and COTS equipment.
- (d) **LP Supply /Emergency lights/ Nav and Survey Equipment etc.** 24V DC.
- (e) **Aviation Power Supplies.** Details placed at Section G - Aviation.

4. All motor driven machinery, galley equipment etc of rating 0.5 KW and above shall be preferably arranged to operate from 415 volts 3 phase distribution system. Machine below 0.5 KW rating and the lighting installation, Radar, W/T and other navigational equipment etc., may be arranged for operation on 230 volts, 1 phase, 2 wire system obtained from step down transformers.

5. All electrical machineries/ systems such as DBs/ Normal and Alternate supplies/ lighting system/light fittings/ protection controls, instruments and indications etc. wherever necessary should be provided as per Class rules.

6. MCCBs, MCBs, fuses, over current and under voltage relays, etc. should be provided for normal functioning and protection of electrical and electronic equipment.

7. Disposition of all electric equipment should be so as to minimise the mechanical damage from water, steam, oil, excessive heat etc. to the extent possible.

8. **Shore Supply Connection Boxes.** Two sets of watertight (IP 57) shore supply connection boxes of adequate capacity with enclosures as per Class

requirements should be provided along with adequate capacity of shore supply cables of length 150 m with stowage arrangement on both sides of the Survey Training Vessel (STV). Motorised with provision for hand operation in case of loss of power for cable reeling drums are also to be provided. One set equivalent of shore supply connection boxes include Port and Starboard side of the ship evenly distributed at suitable location.

9. **Automated Power Management System.** The vessel power management shall be achieved through Automated Power Management System (APMS) complying with classification society norms. The main function of the system would be operation, monitoring, paralleling and continuous parallel of DG sets, operation control and protection of power generation and distribution machineries from the prime mover till the consumer level. One console each will be provided for the main Switchboards.

10. **Main Diesel Alternators.** Adequate number of diesel generators of sufficient capacity conforming to Classification Society rules should be installed onboard. The number of diesel generators should provide 100% redundancy. DAs are to be capable of running in unattended parallel mode. The DAs should be self regulated and self excited. Growth margin to the tune of 10% should be catered for in the power plant design. Electrical Load Chart vis-à-vis capacity of Main Alternator meeting 100% redundancy at maximum load with loading of Alternators at 80% of Nominal Capacity should be provided prior finalising the generator capacities.

11. **Emergency Diesel Alternator.** In addition to the main generators, one stand-alone air cooled emergency diesel generator of sufficient capacity, conforming to Classification Society rules should be provided. The emergency diesel alternator will supply electrical power, through the emergency switchboard, as a totally independent source meeting classification society requirements through auto bus transfer switch mechanism to consumers as indicated. The construction for the emergency switchboard will be similar to that of main switch board and will be installed at suitable location.

12. **Power Distribution System.** The power distribution system is to be catered and controlled through APMS. In general normal supply is to be arranged from the power sources nearest to the load and alternate supply from the sources farthest from the load. Distribution panels meeting Classification Society rules will be installed for vertical distribution and will be fed via 415/230/24 volts, 3 phase transformers or transformer rectifier cum battery charger for lighting and other small power consumers. All circuits will be protected by MCB's. For the failure of primary power system, this distribution panels will be incorporated with the emergency battery bank. All the Domestic supplies would be of four wire system. The following services shall be supplied from two sources through changeover switches as indicated:-

(a) **Hand Change Over Switches.**

- (i) Fire Pumps
- (ii) Engine Room Ventillation fans
- (iii) Conversion Machinery Room

- (iv) General Ventillation
- (v) Main and Auxiliary Engine Room auxiliaries
- (vi) Hoists and lights for ammunition
- (vii) Coolant pumps, control air compressors etc.,
- (viii) Engine Room lighting
- (ix) In addition to above, HCOS is to be provided for all equipment envisaged to be provisioned with supply through Emergency Supply Connection Box (ESCB).

(b) **Auto Changeover Switches.** The Auto Changeover Switches (ACOS) shall complete the change over action in either direction between 40 milli seconds to 100 milli seconds for rotating machineries and to ensure un-interrupted supply to software intensive systems, the change over should be below 40 milli seconds. Following equipment to be provisioned with ACOS:-

- (i) Steering Gear Motors
- (ii) W/T sets
- (iii) Gyro
- (iv) Log
- (v) Echo Sounder
- (vi) Other Nav aids
- (vii) Radar
- (viii) Navigational Lights and other associated equipment
- (ix) Weapons and weapon control systems
- (x) APMS/ IPMS/ IBMS
- (xi) Engine control and DA control panels

13. **Distribution Boards.** Sufficient numbers of distribution boards for 415 V, 230 V, 3 phase, 50 Hz, 240 V, 1 phase and 24 V DC to be installed at appropriate position. All circuits shall be protected by the MCBs of adequate rating. All distribution boards will have minimum spare feeder way.

- (a) DB of 6 way and below - 1 feeder
- (b) DB of 6 way and above - 20% of total feeder to a min 2 feeder

14. **Main Switch Boards.** Two switch boards (main and auxiliary) with bus-bar coupler between each generator section, switch gear and distribution boards conforming to Classification Society rules are to be provided. Switch boards shall be designed for control and distribution of 415 V, 3 Ph, 50 Hz AC supplies with earth fault protection indication alarm, made of 14 SWG sheet steel, totally enclosed dead front, deck mounted with sufficient space at the back and effectively drip proof to be provided. Online insulation monitoring system with audio-visual alarm is to be provided in the switch board. Other requirements of the switch board, including integration of shore supply should be as per Class Rules.

15. **Electric Cables/ Runs.** EBXL insulated cables conforming to Class requirements, shall be used. LFH cables for internal wiring for control systems conforming to marine specifications shall be used in main switch board, control panels etc. The under mentioned aspects shall be considered during installation of cables:-

- (a) Proximity to pipe joints, hot positions, hatchways and openings which may render the cables liable to damage shall be avoided.
- (b) Avoidance of congestion of cables and awkward bends.
- (c) Each and every cable shall be affixed with identification tallies at each end before entering equipment. The tally shall indicate circuit code number as shown on relevant drawings.
- (d) Cables under floor in engine rooms will be run through metallic rigid/flexible conduits.

16. **Motors.** The motors will be selected conforming to Classification Society Rules. Enclosures of the motors will be IP-57 in the weather/ exposed deck areas. In the machinery spaces, motors will be selected to meet the class rules. The motors should have either class 'F' or 'H' insulation according to the temperature of their operating area. The motors and its enclosures will be selected to suit load requirements of various auxiliaries. The system manufacturer would be required to procure the motor and its starter through a single source i.e. the motor manufacturer. The motor manufacturer in turn will procure the starter through IHQ of MoD (N) approved vendor and will integrate the motor, starter, as well as freeze its settings. The motor manufacturer is to ensure completion of starter motor integrated trials and implementation of all required protections will be the responsibility of the motor manufacturer.

17. **Starters and Controllers.** All the starters and controllers provided will be of totally enclosed marine type. They will have in addition, protection as per Class rules and push buttons for start/stop with indicator lamps for running/ failure. Provisions for remote start/stop along with indications will be made as applicable. The control panel for various auxiliaries will incorporate necessary contactors/control devices for efficient and sequential control of motors. Motors below 5 KW will be provided with DOL starters. Motors between 5 and 15 KW will be provided with star-delta/soft starter having protections of over current, short circuit, single phasing/phase failure, earth fault, thermal (thermister) protection and under voltage.

18. **Lighting System.** LED based light fittings shall be provided throughout the STV as per Classification Society specifications. Where necessary, the light sources and accessories should be weather/ flame/ explosion proof. LED lighting is to be provided in non Cat 'A' compartments (CAT A compartments are those radio and machinery compartments which accommodate and facilitate operation of radio equipment, sensitive electronic equipment/ control panels and are susceptible to EMI. Compartments other than Cat A compartments are Non - CAT A compartments). The STV is to be provided with 'darken ship' arrangement with police lights and red lights for night vision protection.

19. **Emergency Lighting.** Rechargeable LED based Automatic Emergency Lanterns (AELs) as per classification society norms will be fitted in all living spaces, working areas, lobbies, and escape routes. Adequate charging sockets for charging the AELs shall be provided across the ship.

20. **Sockets.** Adequate 24V DC sockets are to be provided in all machinery spaces, EMR room, IT room, BCR and equipment rooms. Adequate 230 V 50Hz 4 wire system sockets should be provided in various compartments for use of domestic/ portable appliances conforming to Indian standards.

Communication Systems

21. **Internal Communication.** STV should have voice communication between various locations onboard (user defined) through following internal communication systems:-

- (a) MB/ SRE.
- (b) Intercom System.
- (c) Sound Power Telephone. (The location and number of SPT may be arrived at during finalisation of design, GA and compartment lay out for the vessel)
- (d) Digital Telephone Exchange of 300 lines capacity.
- (e) Motorola sets - 40 hand held VHF Tx/ Rx (Motorola GP 338) with voice ducer, water proof jacket/ bag and one spare battery each.

22. **CCTV Cameras and Monitors.** CCTV cameras fixed and movable should be positioned on the outside and inside STV for monitoring security and safety including machinery spaces. The CCTV system is to be in sync with specifications promulgated by IHQ MoD(N).

23. **Navigation Lights.** Navigation lights and other signalling lights should be fitted as required by International/ IMO regulations. In addition, one all around blue light on top of the mast is to be provided.

Miscellaneous

24. All electrical sub-systems such as DBs, protection controls, instruments, indications etc. wherever necessary should be provided as per Classification norms.

25. **Portable Hand Lamps**. Four portable hand lamps fitted with splash proof protective guard and 20 meter long flexible cables should be provided. Switch sockets should be fitted and wired for portable hand lamps at appropriate locations.

26. **Batteries**. Adequate number of maintenance free lead acid type batteries approved for marine service and housed in FRP/ hard wood boxes with internal lead lining, should be provided for starting of generators and for providing battery backup for LP (24 V DC) supplies to emergency lighting and other consumer equipment. Batteries are to be located in well ventilated spaces. Battery backup for 04 hrs is also to be provided. Further, to meet the requirement of portable survey equipment and system, adequate number of additional batteries must be provisioned in a separate compartment with fixed and portable charging facilities.

27. **Transformers**. Transformers/ rectifiers should be provided with drip proof, air-cooled enclosures suitable for marine use. The transformer will have 'F' Class insulation and rated for continuous operation.

28. **Cable TV Points**. All officers' cabins, office, recreation rooms, dining spaces, ante room, senior and junior sailors messes etc. should to be provided with Cable TV socket.

29. **Emergency Cable Network**. Ship is to be provided with an emergency distribution network of cables as per Classification society rules as applicable for naval vessels to provide temporary power supply to important services in the event of damage to their main power supply cables.

30. **Tallies/ Labelling**. Suitable labelling indicating relevant parameters such as make, serial number, RPM, voltage etc. should be provided for all electrical equipment. Necessary identification tallies should be provided for cables, terminals, connectors, plugs etc. Cables should be tagged at both ends. All DBs, NLP, equipment etc. should indicate the nomenclature of the boxes and the details of incoming and outgoing circuits with the capacity of each fuse and MCB therein.

31. **EMI/ EMC**. Standardised procedures as per NHQ policies on EMI/ EMC (guidelines of ship construction as per latest version of NECP 500 and grounding, bonding and shielding as per MIL-STD-1310H) to be followed. Following issues are to be addressed during design stage:-

- (a) EM simulation studies for Top Deck Layout.
- (b) Scale model studies.
- (c) Consideration of guidelines for construction of CAT 'A' compartments.
- (d) Consideration of existing EMC standards, specifications and guidelines for grounding, bonding shielding, filtering and cabling.

32. **Diagram Plates.** All electrical equipment/ switchboards/ panels/ DB etc. should be provided with Anodised Aluminium diagram plates, clearly showing connections with terminal markings as on the equipment and they should be secured on the underside of the cover of the equipment.
33. **Fuses.** Where Fuses are used for circuit over current protection, they should conform to International standards and should be approved by the Classification Society.
34. **Colour Scheme of Electrical Equipment.** Bare metal surfaces of electrical equipment shall be painted with rust proof paint and finishing paint, except those specially treated and rendered corrosion free.
35. **Marking of Bus-bars and Connections.** Bus-bar and connections of major power equipment shall be clearly marked by means of tapes, paints and equipment name.
36. **Caution Board.** All equipment connected to working voltage above 150 V AC should have caution board affixed in a prominent position. The caution board shall be red in colour with white letters. Framed notice plates demonstrating method of Classification Society Rule Aid for electric shock shall be fitted in the proximity of the switch board.
37. **Window Wipers.** Cat 'C' window wipers operating on 230V, 1 phase, 50 Hz supply and conforming to Classification Society rules are to be provided.
38. INCRETE is to be provided as per *IN* policy in vogue.
39. **Electrical and Electronic Workshop.** The ships are to be provided with onboard repair infrastructure including tools, test jigs and diagnostic software as applicable for first line maintenance and repairs of electrical (HV/LV) systems and electronic equipment, in dedicated well equipped workshops. Coil Winding Shop including facilities for Baking. Should have winding machine, oven, minor PCB repair and a soldering station for undertaking motor rewinding and minor Electrical/ Electronic repairs.

SECTION – N**NBCD**

1. **Major Systems.** Following major fire fighting systems are to be provided:-
 - (a) Battle Damage Control System as part of IPMS. BDCS must be able to control/ monitor all major Fire Fighting Systems and Damage Control Equipment.
 - (b) Fire main system and Salvage Pumping Arrangement.
 - (c) Modern Fixed Fire Fighting Systems for Machinery compartments and AVCAT Storage Compartment (Water Mist/ CO₂).
 - (d) Foam extinguishing/ sprinkling systems for Machinery and Hangar spaces. Standalone AFFF tank of suitable capacity to be provided for Hangar fire fighting. If the net volume of a single Hazardous Space is less than 3000 M³ High Pressure Water Mist Fire Suppression System can be used. This system is supposed to be augmented with AFFF Foam System both in Machinery Compartment bilges and Hangar.
 - (e) Addressable Smoke and Fire Detection System (AFDS) is to be provided and interfaced with BDCS/ IPMS as per latest IHQ MoD(N) policy.
 - (f) Flood Warning / Alarm System as per extant naval guidelines.
 - (g) Ballasting/ De-ballasting System. Capacity of pumps and eductors to be as per latest naval standards.
 - (h) Ventillation System (including AFUs).
 - (j) Remote and Manually operated sprinkling system for Boatswain store, inflammable store and bulkheads and ladders in machinery spaces, Magazine compartments holding ammunition 30mm and below, Gun barbette, Laundry.
 - (k) Breathing air charging panels from main compressor stations. BA charging station facility for 06 BASSCA sets in three pockets of 02 cylinders each is to be provided as a minimum requirement.
 - (l) Suitable Automatic Galley Fire Detection and Fire Fighting system is to be provided with Wet Chemical Suppression for Galley range, and ventilation duct (Flame Hood). Galley Bulkheads to be provided to access the compartment with closed door. Hot plate and deep Fat fryer indication is to be provided outside respective Galleys and also in DCHQ.
 - (m) Fixed Diesel Driven Salvage pumping arrangement to be incorporated.
 - (n) Section wise Smoke Extraction units (SME's) with required ducting.

(p) Dedicated DCHQ with all facilities and Alternate DCHQ (Collocated in a Section Base).

(q) Zoning principles shall be as per Art 07 of Def Stan 02-119. All doors and hatches in Red zone to be fitted with sensors and to be incorporated with BDCS. All hatches in red zone are to be fitted with Indicator Test Plugs (ITP's), Fitment of Photo Luminescent markings for indicating FF and DC gears, escape routes with suitable Hatches and ladders. To indicate the escape route, emergency lighting comprising of LED's fitted all along the alleyway and stair moorings to produce adequate illumination as per extant policy.

(r) Stability software should be incorporated within BDCS. Level sensors in all liquid storage tanks to be incorporated with BDCS. All Tanks including RU Tanks and void spaces, if any are to have continuous level sensors connected to BDCS to calculate Dynamic Stability.

(s) Emergency Bulkhead connections to be provided between all water tight sections for ensuring seamless connectivity of Fire hoses.

(t) Arrangements for Fixed Shoring on Hatches in the 'Red Risk' zone and in all under water compartments. Shores are to be so placed that they do not impede the passageway.

(u) **Fire Fighting in Aviation Section.** The Ship shall have a dedicated AFFF system as a backup to High Pressure water Mist Fire fighting system in the Hangar. The AFFF system shall comprise of the following:-

(i) **Foam Hydrants.** There should be least one AFFF Hydrant inside and outside the Hangar.

(ii) **Foam Spraying System in the Hangar Deck Head.** A foam fire fighting system should be provided for the purpose of controlling a fire within the Hangar. If the Hangar is demarcated into two independent Hangars then each Hangar should have an independent foam fire fighting system. The foam fire fighting system can either be bulkhead mounted foam monitor or deck head mounted sprinkling system compatible to retractable Hangars. In case of overhead nozzles are used they shall be pendant type nozzles that should have a minimum application rate of 10 ltrs/min/square metre. The AFFF reserve tank that will feed the foam to the Hangar shall be large enough to feed AFFF continuously for 10 minutes. The system shall be activated remotely from DCHQ, LSO post and BDCS consoles. The system shall also be able to activate through pull stations situated outside the Hangar.

(iii) **Inline Eductors for the Flight Deck.** The Ship will have adequate number of Inline Foam educators with pick up assemblies for FB 10(X) to spec DPIN/7188(b) and Drg. DQAN/14709 are to be provided in the fire main system around the flight deck.

(v) Independent Gas based/ foam based fixed fire fighting system for paint store.

2. **Portable Systems.** Following portable Damage Control systems are to be provided:-

- (a) Portable Fire/Dewatering pumps with accessories.
- (b) One Portable Diesel Driven BA Charging Compressor. The compressor should be able to charge the BA Sets up to 300 Bar.
- (c) Portable Eductors and accessories.
- (d) One Portable Exhaust Fan per section base with accessories (for smoke clearance).
- (e) One Portable Foam Making Machine.

3. **Fire Fighting and Damage Control Arrangements.** Following to be provided as per NBCD arrangements laid down in extant naval regulations:-

- (a) A separate compartment is to be provided as DCHQ with BDCS console.
- (b) Two Section Bases with adequate space available for DC party of 20-25 personnel to assemble in the main communication deck/ continuous deck.
- (c) Adequate NBCD Lockers for stowage of DC and FF gears. Design of lockers to accommodate a part quantity of all the CNAL items.
- (d) Two NBCD stores for stowage of DC and FF gears. The stores to be located on the main communication deck, in the vicinity of section bases for quick accessibility.
- (e) Stowage arrangements for portable pumps, starters and their accessories.
- (f) Stowage arrangements for telescopic shores. To be located near the hatches on the main communication deck.
- (g) Arrangements for fixed shoring on hatches in the 'Red Risk' zone and on those which cannot be shored due to design limitations (store routes etc).
- (h) Fitment of Indicator Test Plugs on all doors and hatches in the 'Red Risk' zone.
- (j) Fitment of photo-luminescent markings for escape routes and first aid boxes.
- (k) Provision of emergency escape routes with suitable hatches and ladders.
- (l) Fitment of smoke curtains on all doors on the main communication deck.

- (m) Fitment of stowage boxes for BASCCA. Location to be close to the section bases on the main communication deck. Minimum quantity per section base is eight.
- (n) Fitment of stowage boxes for ELSA / BASCCA (EE). Details as given in BR 312.
- (p) Arrangements for stowage of Aluminised Fire Proximity Suits near the section bases and in the helo Hangar.
- (q) Arrangements for stowage of Portable flood lights.
- (r) Arrangements for stowage of Smoke Masks.
- (s) Waterline marking and flooded volume markings for all compartments below the main continuous deck.
- (t) Closing and locking arrangement for main power supply switches of both the galleys (hot plates and deep fat fryers).
- (u) Fitment of first aid boxes.
- (v) Securing arrangements for stretchers.
- (w) Stowage arrangements for FB 5 (X) and foam compound container near Foam Inlet Tubes.
- (x) Stowage arrangements for AFFF and CO2 extinguishers.
- (y) Stowage arrangements for exhaust fan, portable foam making machine, portable BA charging compressors including their accessories.
- (z) A dedicated AC store for stowage of NBC equipment.
- (aa) Volumetric markings to be provided with photo-luminescent paint in all red risk and underwater compartments.

4. **NBDC HQ.** The following arrangements are to be made in the DCHQ for NBCD functions:-

- (a) Fitment of following NBCD Boards as per latest Naval regulations with due consideration to ergonomics of the markers:-
 - (i) BDCS Control Panel.
 - (ii) NBCD Incident Board
 - (iii) Doors and Hatches State Board
 - (iv) BC Ventilation State Board

- (v) Pumping and Flooding Board
 - (vi) Main Systems Board
 - (vii) Liquid State Board
 - (viii) Layout of all BCD Equipment
 - (ix) Deck layout plan.
- (b) Following to be fitted / installed in DCHQ:-
- (i) Key Safe and duplicate key safe.
 - (ii) Fire pump status display
 - (iii) Salvage Pump status display
 - (iv) Fire main pressure indicator of all sections
 - (v) Hot plate/deep fat fryer 'ON' indication for both galleys
 - (vi) Master panel of Fire alarm system
 - (vii) Master panel for Flood alarm system
 - (viii) Main panel of the Automatic magazine sprinkling system
 - (ix) Main panel of the Engine Room fire fighting system
 - (x) Ventilation control panel including crash stopping ventilation
 - (xi) PC with printer and other peripherals
 - (xii) Mimic panel of power supply distribution system.
- (c) Arrangements for stowage of all NBCD books, CDs, Floppies, Duplicate Kill cards, check off lists and BCD files.
- (d) Fitment of keyboard housing the NBCD keys.
- (e) Seating arrangement for 5 personnel with work table, PC and a printer.
- (f) Layout to cater for DCHQ personnel to carry out their functions without hindering others. Positioning of communication panels, control panels and display boards to match with seating plan of the DCHQ personnel.

5. **Section Bases.** Two section bases, one fwd and one aft with following boards pertaining to the individual section base are to be provided:-

- (a) BDCS Mimic Panels.
- (b) NBCD Incident Board.
- (c) Doors and Hatches State Board.
- (d) Layout of all BCD Equipment in section.
- (e) Main systems board.
- (f) Pressure gauge for section fire main.

6. **Communications.** Following arrangements are to be provided between DCHQ, both Section Bases, Bridge, Ops Room, MCR, Cleansing Stations, Helo Hangar, FLYCO, NBCD stores:-

- (a) Sound Power Telephone
- (b) DC Broadcast (Two ways)
- (c) Wirefree communication / field telephone link between NBCD HQ, Section base and BCD teams.

7. **Additional Features.**

- (a) Stability of the ship with the three adjacent major compartments being flooded is to be ensured. Criteria for static, dynamic and intact stability are to conform to NES 109.
- (b) Each watertight section is to have remotely operable independent salvage pump, located at the lowest level possible inside the ship.
- (c) Access to compartments below upper most continuous deck to be only through the watertight sub-divisions to the extent possible.
- (d) Independent ventilation system in each of the major watertight sections of the ship (ensuring smoke tight zones).
- (e) All large areas above waterline to be provided with automatic drainage valves to reduce free surface effect.
- (f) All ventilation motors to be provided with remote control facility. Independent ventilation system in each of the major watertight sections of the ship (ensuring smoke tight zones). The ventilation system should be grouped into separate sections to minimise the spread of smoke, blast and fire.

- (g) All fire pumps be positioned strategically to prevent total loss of high-pressure seawater system by location along the centre line of the ship (with the major portion situated below the water line).
- (h) Maximum physical and electrical separation be provided by appropriate location of generators and laying of the power supply cables.
- (j) Each water tight compartment is to be provided with transformers for domestic lighting as far as possible.
- (k) Cables for power and lighting be easily accessible and made rat resistant.
- (l) All doors and hatches in the Red Zone should be provisioned as per standard specifications respectively.
- (m) An NBCD Class Book is to be issued before commissioning of the ship. The document should contain ship stability data and graphs for quick assessment of the effect of action damage and damage control measures adopted. Various cases describing "dangerous flooding situation" be included in diagrammatic form.
- (n) Portable scanner to be provided for checking water tight integrity of doors and hatches.
- (p) Damage control software is to be provided, giving details of all compartments of the ship and various cases of flooding in U/W compartments with measures to be taken with regards to stability.

8. **Survivability Aspects.** Survivability aspects are to include:-

- (a) Dispersal of Magazine and fuel tanks as far as possible.
- (b) Siting of vital compartments in areas likely to be less vulnerable to sea Skimming Missiles.
- (c) Through passageways are to be minimised below decks.
- (d) Use of Aluminium, plastic and other inflammable materials is to be minimised. Aluminium superstructure, if any is to be coated with fire resistant material.
- (e) Siting of Hatches and Doors to cater for shoring of individual hatches in case required for isolating.

SECTION – P**DIVING**

1. **General.** Under-mentioned arrangements to be catered onboard for safe handling, stowage and maintenance of diving equipment:-

(a) Provision of Air-conditioned Diving store (10' x 12') adjacent to/ below Quarter Deck with arranged racks for stowage of the following:-

(i) Provision for two waterproof/ light-weight steel/ metallic alloy boxes of sizes 3' x 2' x 2' for safe storage of expensive diving equipment.

(ii) Three cupboards (size 5' x 3') fitted to the bulkhead, two cupboards with racks for storage of diving equipment and one with pigeon hole slots/ space for equipment spares. Also, one safe (size 2' x 2' x 2') be provided for storing expensive equipment.

(iii) Provision of wooden rack with nylon straps to vertically secure six diving sets of size 2' x 3' x 1'.

(iv) A panel with Air Filters, reducers, relief valve, HP hose with charging adaptors and HP pipe system from fixed compressors for charging of diving sets.

(v) Arrangement for hanging four 8 and 15 feet HP hoses on bulkhead.

(vi) Full length-hanging space with heavy-duty hangers to stow Neoprene Diving suits.

(vii) One dehumidifier should be fitted in the compartment for reducing the humidity as required for rubberised gear.

(viii) Provision for a Fridge (165 Its) for storing diving ration issued to divers.

(ix) Storage space for metal blanks supplied for underwater blanking of inlets.

(b) One separate air-conditioned compartment/ Cabin of 8'x 10' to function as maintenance space/ office to be provided to carry out maintenance/ repairs of diving equipment.

(c) Provision of two sets of wooden chocks on Quarter Deck for stowage of two inflatable craft.

(d) Provision of after use routine tank for two OBM's with inlet and drain valves, size (2.5' x 2' x 4').

(e) Storage space for portable HP Air Diving Compressor and four in number storage bottles of capacity 30 Its each (working pressure 300 bars) on quarterdeck connected with HP Stainless steel pipes and a Charging panel with four outlets for supply of breathing air to Diving sets. The intake of air for the compressor should be away from exhaust gases and from an open space.

(f) Rubber Roller (2 ft length) with ball bearings on one side of QD with rubber padding for hoisting/ lowering of inflatable craft. The rollers should protrude slightly outside the ships side to avoid rubbing/ damage to inflatable crafts during manual hoisting.

(g) Davit/ crane for hoisting/ lowering of inflatable craft and OBM next to the roller.

(h) Provision of fresh water point near QD/ diving site for carrying out after use routines of diving equipment on completion of operation.

(j) **POL Storage Space.** One RU locker to be provided at Quarter Deck/ site of launching Inflatable crafts for storing of POL used for OBMs and Compressors.

2. **Additional Facilities.** Additional facilities required for undertaking diving ops and safe handling of diving equipment are as follows:-

(a) Provision for two overhead floodlights at the QD to undertake diving operations at night.

(b) A copy of all sketches and photographs of underwater fittings, inlets/ outlets and propulsion system for briefing of all divers prior to undertaking diving operation.

(c) One computer with DVD writer/ LAN connection and colour LaserJet printer in office for monitoring and recording information from underwater cameras, hand held sonar and demanding of equipment/ stores.

(d) Electrical charging panel for charging of rechargeable batteries.

(e) A LP vehicle washing kit with 60 feet soft hose and adjustable pressure nozzles for after-use routines (washing) of diving equipment.

(f) Adequate number of waterproof Canvas covers for covering inflatable crafts, OBM, Compressors and diving sets.

(g) Supply of neutrally buoyant Metal Blanks with waterproof coaming and 'J' Bolts of appropriate size for blanking/ blocking Sea Chests, inlets for DAs, ACs etc for undertaking in situ repairs in afloat condition.

(h) One foldable Umbrella/Canopy for use on upper decks when carrying out repairs to diving equipment.

3. **Diving Equipment**. The Diving Outfit Allowance list for the ship is placed at **Annexure 'D'** and should form part of D787 of the ship. It is recommended that the procurement of the diving equipment should be as per specifications promulgated by IHQ MoD (N).

Annexure D
(Refers to Para 3 of Section 'P')

DIVING OUTFIT ALLOWANCE LIST SURVEY TRAINING VESSEL

Ser	Description	Qty Sanct
1.	Breathing Apparatus Self Contained Compressed Air (General Purpose) consisting of following:-	06
	(a) Regulator Unit	06
	(b) Positive Pressure Face Mask	06
	(c) Harness	06
	(d) Cylinder Unit(300bars, 2 cylinders, 4 Lts each) DIN	06
	(e) BCD Jacket	06
	(f) Mini Test Kit	01
	(g) Tool Kit	01
	(h) Onboard Spares for 2 years	01 set
	(j) Spiro Metric Test Kit	01
2.	Surface Demand Diving Equipment (SDDE) (for diving to 55 mts for 2 + 1 persons) complete, consisting of:-	02
	(a) Dive Control System with communication, gauges and shut off valves	
	(b) Divers Communication System integrated with Control Panel and Divers Harness	
	(c) Dive Umbilicals to support dive to a depth of 75 mtrs	
	(d) Four Breathing Apparatus Self Contained Compressed Air Harness complete consisting of following:-	
	(i) Regulator units	
	(ii) Positive Pressure Full Face Masks	
	(iii) Harness	
	(iv) Cylinder Unit (300bars, 2 cylinders, 4 Lts each) DIN	
	(v) BCD Jackets	
	(e) Onboard Spares for 2 years	01 set
	(f) Tool Kit	01
	(g) Storage Bottles 30 lts, working pressure 300 bars with two 8 & 15 feet HP hoses for charging and supply of air to Control Panel respectively	04
3.	Jacket Divers Dress (Neoprene 3mm thickness) – Medium	02
4.	Jacket Divers Dress (Neoprene 3mm thickness) – Medium Large	02
5.	Jacket Divers Dress (Neoprene 3mm thickness) – Large	02
6.	Trousers Diver Dress (Neoprene 3mm thickness) – Medium	02
7.	Trousers Diver Dress (Neoprene 3mm thickness) – Medium Large	02
8.	Trousers Diver Dress (Neoprene 3mm thickness) – Large	02
9.	Shoe Divers Dress (Neoprene 3mm thickness) – Medium	02
10.	Shoe Divers Dress (Neoprene 3mm thickness) – Medium Large	02
11.	Shoe Divers Dress (Neoprene 3mm thickness) – Large	02
12.	Hood for Divers (Neoprene 3mm thickness) in three sizes Small, Medium and Large	06
13.	Gloves for Divers (Neoprene 3mm thickness) in three sizes S, M & L	06
14.	Mask Swim, Silicon	06

<u>Ser</u>	<u>Description</u>	<u>Qty Sanct</u>
15.	Tube Snorkel	06
16.	Swim Fins (Improved – Graphite) with Back Strap	14 Pr
17.	Waterline Flood Light 1000 Watts complete (Hand Held)	04
18.	Lamp Search Divers complete (Head Mounted) with rechargeable battery, charger and bulb 50 watts)	06
19.	Divers U/W Communication System with battery (compatible with diving set)	06
	(a) Headset Electrical with Boom Microphone & Battery	06
	(b) Amplifier Belt	06
	(c) Diver Microphone and Earphone	06
	(d) Life Line Communication rope with connectors	06
20.	Knife swimmers light and rust proof	06
21.	Sheath for knife with straps to be tied on thigh/ pass through life belt	06
22.	Inflatable Gemini Craft Medium complete(with spares & accessories) (As per NCD 1104 specifications)	02
23.	30 HP OBM complete with flexible fuel tank & 2 years spares(Make Mariner/ Yamaha as per DME letter EG/3449/DSL dated 11 Jan 2000)	02
24.	9 CFM Portable HP air diesel driven compressor with 2 year spares. Working pressure upto 300 Bar	01
25.	Shark Repellent Compound	25
26.	Chloroprene sheets, waterproof, light, impact proof 3' x 7'	06
27.	Life Belt	06
28.	Weight Belt (Diver) with four/ six pouches	06
29.	Buddy Line	04
30.	Weight 1 & 2 Kg	10 each
31.	Ladder Adjustable Diver	01
32.	Watch Diver Supervisor Titan PSI 200 Model No. 53302	01
33.	Float Spherical for marking(buoyancy of 5 kgs)	02
34.	Sinker Concrete 25 Kgs	04
35.	8 mm Poly Lifeline 220 mtrs	03 rolls
36.	Carabineer Non-magnetic	04
37.	Multi Purpose knife/tool	02
38.	Salvage Bags of enclosed and parachute type with lift capability 0.1T and 0.5T	02 each
39.	Carry-mat sheets, waterproof, light, impact proof 3' x 7'	04
40.	Diving Manual (through INDIA)	01
41.	Handbook of Diving Equipment	01

SECTION – Q**MEDICAL**

1.	Capability	The ship should have all facilities for easy conversion to Hospital Ship. The ship should have necessary support infrastructure, to cater for disaster management and SAR role.
2.	Medical Complement	One general duty Medical Officer and two Medical Assistants.
3.	Sick Bay	The Sick Bay will also be the Primary Operation Theater (OT). It is to be suitably located near Helo Deck or on the same deck to facilitate easy transfer of casualty to Sick Bay. Sick Bay should have low noise and vibration levels. It is to have three distinct sections – MO's Examination Room, Patient's Accommodation and an Operation Theatre (OT) with a pre-op room for one patient. The following are to be provided in the Sick Bay:-
(a)	OT	<p>(i) A Surgeon's scrub room.</p> <p>(ii) A foot-operated sink with splashguard, a deep sterilisation unit and a portable auto-clave, with proper securing arrangements and electrical sockets of adequate rating for each. Elbow taps, soap dispensers and hand driers are also to be provided.</p> <p>(iii) One hydraulically adjustable Operating Table and shadow-less Operating light, above the Operating table. The interior of the OT should be designed to prevent accumulation of dust and deny hiding space for rodents. There is to be adequate space to work around the table. In addition, a mobile, shadow-less operating light is also to be provided.</p> <p>(iv) Four glass-front steel cupboards, with adequate partitions and bottle slots of varying sizes, for medicines and surgical instruments.</p> <p>(v) Two hooks for I.V. bottles from the ceiling in the OT. In addition, one hook each near the patient's beds.</p>
(b)	MO's Examination Room	<p>(i) MO's room to have a table and examination couch with adequate space for seating two patients. Wash basin is to be provided in MO's examination area.</p> <p>(ii) One small safe for storing controlled/ dangerous drugs.</p> <p>(iii) X-ray view box.</p> <p>(iv) Additional lighting should be provided in patient examination area/MOs examination room.</p>
(c)	Patient's Accommodation	<p>(i) Four single surgical beds in the patient's accommodation with IV Hanger and reading lamp. The beds should be placed in a suitable (fore and aft) configuration to minimize the effects of rolling.</p> <p>(ii) Attached WC and bath.</p>

		(iii) One isolation cabin with two beds is to be provided.
(d)	General	<p>(i) Partition between MO's Room and patient's accommodation. One FCU is to be fitted for the Sick Bay, in addition to a separate ATU from the ship's air conditioning system.</p> <p>(ii) A partition between the operating area and the patient's area with separate ventilation arrangement.</p> <p>(iii) One frost-free refrigerator.</p> <p>(iv) One table with beading and one almirah for medical accessories.</p> <p>(v) Tread strips for contact discharge of static electricity</p> <p>(vi) Additional shelves/ cupboards, within the space available, for storing equipment, medicines and documents.</p> <p>(vii) Table top Microwaves – 02 nos.</p> <p>(viii) Oxygen Cylinders.</p> <p>(ix) 1 KW Water Heater (25 Ltrs).</p> <p>(x) 04 additional 15 Amp Sockets and 5 Amp sockets each.</p> <p>(xi) A dispensary with adequate racks/ stowage arrangements is to be provided in the sickbay.</p>
4.	Isolation Ward	This compartment should have two bunks and located in the least habituated portion of the ship. A separate ATU should be there for isolation ward. This space can be used as living space when vacant.
5.	Medical Store	A separate air-conditioned compartment with adequate racks and cupboards, in the vicinity of the sick bay, is to be provided for storing medical equipment and expendable stores/ drugs.
6.	Medical Equipment	Ship is to be provided with Medical Equipment Scale N1 Type 'B' by AFMSD as per GOI, MoD letter No. 20069/ME Scale/DGAFMS/DG2C/IN Ships/MoD/572/07/D(Med) dated 23 Jul 2007 (details placed at Annexure 'E') or current policy in vogue at the time of commissioning.
7.	Stretchers	<p>Neil Robertson Stretchers are to be positioned suitably along the main alleyway/ in suitable positions distributed along the ship along with securing cabinet. Stretchers on weather deck should have cabinets for storing. Remaining stretcher can be kept in Medical store. The following stretchers are to be provided:-</p> <p>(i) Airborne Stretchers – 02</p> <p>(ii) Neil Robertson Stretchers - 10</p> <p>(iii) Scoop Stretchers - 02</p> <p>(iv) Floating Stretcher - 02</p> <p>(v) Basket rescue stretcher – 02</p>
8.	First Aid Boxes	<p>One each First Aid Box flushed with bulkhead is to be provided at the following locations:-</p> <p>(a) Bridge</p> <p>(b) Junior Sailors Dining Hall</p> <p>(c) Ship's Galley</p> <p>(d) Officers' Galley</p> <p>(e) MER</p>

		<ul style="list-style-type: none"> (f) AER (g) Helo Hangar (h) Foxle (j) Quarter deck (k) Battery Charging Room (l) All mess-decks (m) DCHQ (n) Damage Control Posts.
9.	First Aid Posts (FAP)	First aid posts should be suitably located near each action post/ citadel. Atleast one FAP should be located on each deck. One NR stretcher, one small oxygen cylinder and one first aid box should be available at FAP.
10.	Fresh Water Supply	The fresh water distribution system in the ship is to have a separate, isolatable branch for medical compartments, such that a provision exists for supply of continuously running fresh water in all medical compartments, in isolation from other consumers.
11.	Location of Compartments and structuring of Alleyways	<p>Following to be incorporated:-</p> <ul style="list-style-type: none"> (a) All medical compartments and OTs are to be in close proximity of each other, as far as practicable. (b) Direct access through doors, opening into the main alleyway to be provided to Medical space, for ease of casualty movement. (c) All alleyways and hatches to be so designed so as to enable easy carriage of casualty stretchers. (d) Operation theatres should be so located that easy transfer of casualties, by means of wheeled stretchers, is possible.
12.	Washing Machine	A COTS fully automatic washing machine is to be installed in patient's bathroom.
13.	Biomedical Waste Disposal	All equipment, consumables and chemicals as per IMO regulations for dealing with infective, non-infective waste from the hospital area together with ship's waste products is to be provided as laid down in current guidelines/ Policy letters.
14.	Conversion to Hospital Ship	<p>Necessary facilities for the quick conversion of the ship to the Hospital Ship are to be provided. Details placed at Annexure 'F'. In addition to the requirements enumerated at Appendix 'F' the following is to be provided:-</p> <ul style="list-style-type: none"> (a) One compartment is to have flooring of such materials so as to cater for high pressure steam sterilizer (auto claves). (b) Facility for retrofit for a portable Mortuary at a suitable location should also exist. (c) Permanent shadow-less OT Lights in Ward room and Junior Sailors' Dining Hall concealed under deck head panelling to be provided. (d) A cabin with water and electric points is to be provided as fitted for use as a laboratory without equipment

Annexure E

(Refers to Para 6 of Section 'Q')

ME SCALE FOR IN SHIPS**SECTION - 03 (ASEPTIC FURNITURE)**

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
1	030100	Back Support	No	1	1	--	--
2	030101	Cabinet Instruments overall Dimension 160cm X 66cm X 45cm complete	No	2	1	1	--
3	030105	Cabinet Instruments 60cm X 45cm X 30cm with stand complete	No	1	1	1	--
4	030110	Cabinet Instrument Hook 10.16 cm long	No	36	12	12	--
5	030120	Castor for assorted aseptic furniture (Overall diameter of metallic wheel 4cm. overall diameter of metallic wheel fitted with rubber type 6.2 cm)	No	4	4	6	2
6	030125	Castor swivel 5cm dia	No	12	12	1	1
7	030140	Chair revolving with adjustable back	No	1	1	1	--
8	030141	Contoured cervical pillow	No	1	1	1	--
9	030170	Shelf 66cl11 X 45c111 for tables and trolleys (5S)	No	2	2	-.	--
10	030175	Shelf S5 68.50cm X 45.72cm	No	2	2	--	--
11	030195	Stool adjustable with S5 top	No	2	1	1	1
12	030215	Table Instruments folding light (5S) with two (55) shelves complete	No	2	1	1	--
13	030225	Table Operating folding light weight version	No	1	1	1	1
14	030230	Table Operating folding light weight version (PV030225) canvas case for	No	1	1	1	1
15	030245	Table operation sponge rubber pad set of 3	Set	1	1	1	1
16	030380	Vaccine Carrier	No	1	1	--	--
17	030390	Medical Refrigerator	No	1	1	--	--

SECTION - 04 (ANAESTHETIC APPLIANCES)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
18	040016	Apparatus O ₂ inhalation portable tilling adapter for	No	1	1	1	1
19	040017	Apparatus Oxygen concentrator provides 95% O ₂ purity at 5 LPM	No	1	1	1	1
20	040018	Apparatus resuscitator lung automatic complete with O ₂ cylinders 340 Itr. Capacity tubing connection face mask flow meter and ventilating unit	No	1	1	1	1
21	040019	Apparatus Oxygen portable light weight set 200ltr Complete with the full cylinder (Normal air type C 990)	No	2	2	1	1
22	040020	Apparatus Oxygen portable light weight cylinder oxygen 200 Itr. Empty complete with reducing valve, dust cap and cylinder contents gauge for	No	2	2	1	1
23	040057	Cylinder Oxygen (O ₂) 1246ltr. with bull nose fitting valve painted Black with white valve end empty for	No	3	2	2	2
24	040061	Cylinder Oxygen bull nose fitting tine adjustment valve with pressure gauge and bobbin flow meter with double walled tube for	No	3	2	1	1
25	040062	Cylinder Oxygen key spanner for	No	2	2	1	1
26	040063	Cylinder flush. type key spanner for	No	2	2	1	1
27	040064	Cylinder Oxygen stand (to hold 623 Itr. And 1246 Itr. cylinder) for	No	2	2	1	1

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
28	040082N	ECG / NIBP / SPO2/TEMP Monitor	No	1	1	--	--
29	040094	Forceps endotracheal tor introducing endotracheal tubes adult size	No	1	1	--	--
30	040096	Forceps Tongue	No	2	2	2	1
31	040105	Haemoglobinometer	No	1	1	1	--
32	040120	Laryngoscope (Adult) complete	No	2	2	2	1
33	040162A	Nebuliser electric	No	1	1	1	--
34	040162B	Mask tor Nebuliser	No	1	1	1	--
35	040167	Outfit resuscitation Ambu MK-III complete with oxygen reservoir attachment patient valve and Ambu peep vavle	No	2	2	1	1
36	040177B	Pulse Oximeter Table Top	No	1	1	--	--
37	040183	Respirator intermittent positive pressure manual bellows inflating bag complete	No	2	2	2	--
38	40205	Steriliser Electric tor surgical Instruments 510mm X 200mm X 150mm (Internal) 2500 watts	No	1	1	1	--
39	40211	Steriliser steam portable high pressure drum for 275mm X 240mm deep	No	2	2	2	--
40	040292N	Total Temperature management Blanket model 300/310 Adult/ Paed	No	1	1	1	--

SECTION - 05 (GENERAL INSTRUMENTS AND APPLIANCES)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
41	050001	Apparatus suction portable ; 230 V, AC	No	1	1	1	--

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
42	050002	Apparatus suction portable spare bottle suction	No	1	1	1	--
43	050089	Forceps, Artery straight 14 cm	No	4	4	2	2
44	050090	Forceps, Artery curved on flat 12.5 cm	No	4	4	2	2
45	050091	Forceps, Artery straight	No	3	4	2	2
46	050103	Forceps dissecting fine 12 cm long with tooth, notch and serration, stainless steel	No	3	3	1	1
47	050105	Forceps dissecting serrated (fig I) 13 cm	No	3	3	2	2
48	050107	Forceps. sinus, toothed 12.5 cm	No	2	2	2	1
49	050116	Forceps, sinus, 18 cm	No	2	2	1	1
50	050119	Forceps. Sponge holding with serrated jaws 24cm	No	2	2	1	1
51	050120	Forceps sterilizer (cheatle)	No	2	2	1	1
52	050148	Headlight with adjustable head band 7½ feet length with fibre-optic cable of 4 diameter in leather case	No	1	1	--	--
53	050158	Instruments regimental medica1 pannier, roll of, complete	No	1	1	--	--
54	050I69	Knife bard parker hand1e size 1 fitting (Com no 3) for use with commercial blade no 10,11,12,&15	No	2	2	1	1
55	050170	Knife bard parker. handle size 2 fitting (Com No 4) for use with commercial blade no 20.22,23	No	2	2	--	--
56	050186	Needle holder, 19cm box joint	No	2	2	1	1
57	050211	Percusser Dabinski	No	1	1	1	1
58	050223N	Puncture resistant gloves for high risk HIV/HBs, Ag +ve cases	No	5	3	2	1
59	050226	Proctoscope self illuminating with transformer	No	1	1	--	--

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
60	050229	Retractor 4 pronged blunt 2.8 cm x 22 cm long stainless steel	No	1	1	--	--
61	050257	Scissors. shop 23.5 cm long carbon steel chromium plated (lister type)	No	2	2	1	1
62	050258	Scissor, dressing , sharp and blunt, 14 cm long SS	No	2	2	1	1
63	050259	Scissor. dressing straight, both points sharp 12.5cm	No	2	2	1	1
64	050262	Scissor straight 19 cm	No	2	2	--	--
65	050264	Scissor surgical curved blunt pointed 11.5 cm	No	2	2	1	1
66	050265	Scissor Surgical straight, sharp, pointed 11.5 cm	No	2	2	1	1
67	050270	Syringe and Needle destroyer	No	1	1	1	1
68	050278	Sphygmomanometer, aneroid type, 300 mm scale with bandage cuff complete in case	No	2	2	1	1
69	050279	Sphygmomanometer, mercurial, portable type complete.	No	2	2	1	1
70	050287	Stethoscope folding with flat diaphragm type chest piece	No	2	2	1	1
71	050304	Tape, measure, linen 1.5 metre	No	3	3	2	2
72	050305	Torch, hand, chromium plated, brass standards cells fitted with a bulb of 6.2 V without cells	No	4	4	2	1
73	050306	Torch. hand chromium plated bulb of 6.2 V for	No	5	5	5	2
74	050307	Tourniquet	No	6	6	2	1
75	050472	Suction Noiseless	No	2	1	--	--

SECTION - 06
(EAR, NOSE, THROAT INSTRUMENTS)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
76	060003	Atomiser, Nose and Throat, Complete	No	1	1	1	1

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
77	060008	Auroscope fibroptic light transmission halogen lamp 3V	No	2	1	1	1
78	060081	Depressor, tongue, large, 1.9 cm	No	2	2	1	1
79	060115	Forceps ear dressing 14 cm 55	No	2	2	1	1
80	060126	Forceps. Aural. Dressing:	No	2	2	1	1
81	060130	Forceps, Nasal, Dressing	No	2	2	1	1
82	060143	Fork, Tuning, C-1-256 vibrations per second	No	2	1	1	1
83	060229	Mirror, laryngeal handle for	No	1	1	--	--
84	060237	Mouth gag Tongue depressor adult, lane for size 6	No	1	1	1	1
85	060238	Mouth gag, Tongue depressor. adult medium, for size 4	No	1	1	--	--
86	060239	Mouth gag, Tongue depressor, adult small. size 2	No	2	2	--	--
87	060212	Myrigotome with cover	No	1	1	--	--
88	060347	Speculum, nasal, size 6	No	1	1	--	--
89	060359	Syringe, Ear. metal 114 ml, with wide nozzle	No	1	1	1	1

SECTION - 07 (EYE INSTRUMENTS& APPLIANCES)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
90	070191	Retractor, eye lid medium	No	1	1	--	--
91	070237	Spectrum, eye lid clark	No	1	1	--	--
92	070261	Test type distant version, rotating drum, internally illuminated distance control, with plastic panel (PV07885) and four tests (worth four dot duo chrome friend and spotlight) 220 V 50 cycles AC complete	No	1	1	1	--

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
93	070262	Test type reading Hindi and English double page in book form in plastic cover	No	2	2	1	1
94	070263	Test type distant vision, set of 4 charts	No	2	2	1	1
95	070264	Test type distant vision, charts painted on plastic version set of 4 complete	No	2	1	1	1
96	070265	Test type colour vision	No	1	1	1	1
97	070441	Ophthalmoscope Direct	No	1	1	1	--

SECTION - 08 (FRACTURE AND ORTHOPAEDIC EQUIPMENT)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
98	080037	Crutch, adjustable, aluminium complete with ferrule rubber	No	1	1	--	--
99	080038	Crutch, elbow aluminium, telescope complete with ferrule rubber	No	1	1	--	--
100	080047	Cradle, Bed folding -10.5 cm wide X 53.3 cm long X 25.5 cm high	No	1	1	--	--
101	080233	Saw, plaster (Engal)	No	1	1	--	--
102	080239	Shears, plaster (Bohler) SS, 24cm	No	1	1	--	--
103	080244	Splint, Aeroplane, adult size	No	2	1	--	--
104	080249	Stick, walking. shipton handle, 100cmlong X 2.5cm dia	No	1	1	--	--

SECTION -12 (SURGICAL DRESSING)

Ser	New PVMS No	Nomenclature	A/U	Type A	Type B	Type C	Type D
105	120073	Haversack Medical Empty	No	2	1	1	1

Annexure F

(Refers to Para 14 of Section 'Q')

FACILITIES REQUIRED FOR HOSPITAL SHIP CONVERSION

1. Recommended areas and Compartments for Hospital Ship and modifications required on board are as follows. All wards and clinical side room, X-ray room, ICU are to be provided with three 15 Amps sockets and three 05 Amps sockets:-

Ser	Area required	Location Recommended	Remarks
(a)	Casualty Reception Area/ First Aid Post (FAP)	Helo deck / Boat Deck/ RAS Point	(i) Most of the casualties are likely to be received by helicopter. (ii) However, during natural disasters, the ship, being along side, may receive on the Quarter deck.
(b)	Triage, Resuscitation and Walking Wounded Station	Quarter Deck	For immediate Resuscitation, Triage. Hold large number of casualties. (i) 20 x 1.5 inch hooks fitted overhead deck for IV bottles (ii) Provision of OH tank with tap and soap dispenser for hand washing (iii) Extension cords with 5 electrical points each of 5 and 15 Amp rating
(c)	Pre-Op and Resuscitation	LO and LOGO cabin	Cabins next to OT and Reception Area for all Priority 'I' and some Priority 'II' cases.
(d)	Operation Theatre	Ward Room	Large area with pantry serving as CSSD. (i) One 15 Amp and one 5 amp socket in each bulkhead (total 06 points) provision for fixing the operation theatre table. (ii) Provision of permanent shadow-less OT lights. (iii) Hooks for IV bottles: 10 from deckhead and 03 in each bulkhead. (iv) Arrangement for two 2-ton split AC fitment. (v) Entrance to the Wardroom to be wide and provided with sliding doors. (vi) Securing arrangement for three medium sized steel cupboards.
(e)	CSSD and Scrubbing Area	Ward Room Pantry	For autoclaving instruments. Water and power supply to be available. (i) Two 15 Amps sockets for autoclaves. (ii) Two 5 Amps sockets for other equipment (iii) Sliding door for entry into Ward Room

Ser	Area required	Location Recommended	Remarks
(f)	Lab and BTD	Sr. Sailor's Pantry	For basic laboratory investigations prior to surgery. Water supply and drainage to be available. (i) Two 5 Amp and 15 Amp sockets each (ii) Fitment of 90 L refrigerator
(g)	ICU and Post-Op Ward	MCPO's Mess (10 bunks)	For management of unstable and critical patients. (i) Arrangement for one 2-Ton split AC fitment (ii) Two 5 Amps sockets on each bulkhead (iii) Hooks for IV bottles to be fitted from deckhead at each end of bunk
(h)	General Ward/ Officer's Ward	ERA's Mess (10 bunks)	All wards to be co-located in adjacent compartments. Hooks for IV bottles to be fitted from deckhead at each end of bunk
(j)	Surg II Ward	PO's Mess (18 bunks)	
(k)	Surg I/ Burns Ward	CPO's Mess (10 bunks)	
(l)	Isolation Ward	Sick Bay	Separate ATU and Toilet
(m)	Dental Centre	Sr Sailors Dining Hall	Power, water supply and drainage available
(n)	Dispensary	Canteen	(i) For dispensing medicines for cold cases. (ii) Storage Cabinets for medicines to be provided. (iii) Arrangement for 90 L refrigerator.
(p)	X-ray Room	Regulating Office	(i) A Portable 160 mA x-ray machine with automatic developer is to be provided and installed. (ii) Securing arrangement for Portable X-ray machine (iii) Shielding of the room to prevent radiation hazard (iv) 15 amp power socket – 03, 5-Amps sockets - 03 (v) Table for laying patients
(q)	X-ray film developing room (Dark Room)	Oceanographic Lab	Water supply and drainage available. Fitment of Wash Basin Large (24" x 18") and low intensity Red Light.
(r)	Medical and Naval Store	Survey Chart Room	Large area, for storing reserves of medicine and equipment
(s)	Medical Records Section	Survey Instrument Room	

Ser	Area required	Location Recommended	Remarks
(t)	Laundry / Sluice Room	Ship's Laundry/ SS Bathroom	
(u)	Mortuary	Foxle/ Bamboo Deck	Two Deep freezers are to be installed

2. Additional Medical Stores/ Equipment required for the conversion are as follows:-

(a) Provisions are to be made for adequate storage space for embarking Mobile Surgical Unit (MSU) that will consist of equipment weighing approx. 02 Tons.

(b) Following additional equipment to be fitted onboard for conversion to hospital ship :-

(i)	Electro-cautery	-	01
(ii)	Defibrillator	-	02
(iii)	Multifunction Cardiac Monitor	-	03
(iv)	Portable Suction Apparatus	-	04
(v)	X-ray view box	-	03
(vi)	ECG machine 12 lead	-	01
(vii)	Portable ventilator	-	02(Adult) 01(Paediatric)
(viii)	Paediatric Laryngoscope Set	-	01
(ix)	Endo-tracheal Tubes of various sizes		
(x)	Portable digital X-ray machine with automatic developer (160mA)	-	01
(xi)	Semi Auto analyser	-	01
(xii)	V Scan (Hand held USG)	-	01
(xiii)	Blood Gas Analyser	-	01
(xiv)	Sandor Haemat Analyser	-	01
(xv)	Automated Urine Analyser	-	01
(xvi)	Transport Ventilators	-	02
(xvii)	Adequate Gas Bank (Oxygen and Nitrous Oxide)	-	01
(xviii)	AED	-	02
(xix)	Oxygen Concentrator	-	02
(xx)	Electronic Suction Unit	-	04
(xxi)	Foldable Emergency Stretcher with wheel		02
(xxii)	Wheel Chair (folding)	-	01
(xxiii)	Isolation Stretcher	-	01
(xxiv)	Stair Stretcher	-	01
(xxv)	Res-Q-Mat	-	01
(xxvi)	Water Rescue Basket Stretcher	-	01
(xxvii)	Vacuum Splints	-	01 Set
(xxviii)	Diathermy machine with Lead and plates		
(xxix)	Slider for stretchers	-	10
(xxx)	Blood storage cabinets	-	02

SECTION – R**TRAINING****1. Training Facilities.**

(a) **Class Rooms.** Two modern class rooms one with a capacity of 30 and the other with a capacity of 10 to train personnel that would also serve as facilities for planning and execution of the hydrographic surveys. It should be equipped with a 52" LED (or later generation) display capable of interfacing with laptop/PC for briefings and presentation. In addition, it should include state-of-the-art training gadgets such as smart boards, projection system, recordable Public Address (PA) system and training LAN. The class rooms should have cap stand, mini lockers and coffee/ tea vending machines.

(b) **Training LAN.** A 40 node training LAN with latest configuration must be provided for hands on training on survey software and system.

(c) **Personal Digital Assistant (PDA).** 40 PDAs or equivalent must be provided for U/T as training material loaded with all training/ equipment manuals and publications.

(d) **Survey Library.** An exclusive library with professional reference material and hydrographic publication must be facilitated for trainees. The list of additional professional material and hydrographic publication will be provided.

(e) **Training Office.** The training office will be located adjacent to the class room for training administration. The office will have adequate facilities similar to ship's office.

(f) **Training Store.** The training store will be located in a suitable location for issue of training material and temporary storage space for portable survey equipment. This will be an air-conditioned space.

2. Training Accessories. The following system will be provided additionally for training:-

(a) Two X heavy duty shredders.

(b) 40 scientific calculators.

SECTION – S**INFORMATION TECHNOLOGY****ADMINISTRATIVE LOCAL AREA NETWORK (ALAN)**

1. It is planned to install Administrative Local Area Network (ALAN) on Survey Training Vessel (new) to network all departments of the ship, including training requirements. LAN will facilitate sharing of resources (storage media, printers, application software) and electronic mail amongst users. The ALAN will include the training LAN requirement also for all aspects of provisioning connectivity, patch management, antivirus, security patches and administration.
2. The specific technical characteristics and parameters to address the admin and training requirements of Administrative Local Area Network (ALAN) to be established would be provided with Guideline Specifications.

INFORMATION PROFORMA
(INDIAN VENDORS)

1. **Name, address and Unique ID (if any) of the Vendor/ Company/ Firm.**

(Company profile, in brief, to be attached. In the eventuality of the firm emerging as L1, Contract will be concluded in the name and address of the firm, as indicated here). Vendors are to undertake that any subsequent proposal for change in name of firm or address, will be intimated to IHQ MoD(N) at the first available opportunity and supporting documents be furnished accordingly within five working days of their approval by the competent authority.

2. **Type (Tick the relevant category).**

Original Equipment Manufacturer (OEM) Yes/ No

Authorised Vendor of foreign Firm Yes/ No (attach details, if yes)

Others (give specific details) _____

3. **Contact Details.**

Postal Address:

City: _____ State: _____

Pin Code: _____ Tele : _____

Fax: _____ URL/Web Site: _____

Email : _____

4. **Local Branch/ Liaison Office in Delhi (if any).**

Name & Address: _____

Pin code: _____ Tel : _____ Fax: _____ E mail : _____

5. **Financial Details.**

(a) Category of Industry(Large/ medium/ small Scale) : _____

(b) Annual turnover : _____(in INR)

- (c) Number of employees in firm: _____
- (d) Details of manufacturing infrastructure: _____
- (e) Earlier contracts with Indian Ministry of Defence / Government agencies:

Contract Number	Equipment	Quantity	Cost

6. **Certification by Quality Assurance Organisation.**

Name of Agency	Certification	Applicable from (Date)	Valid till (Date & Year)

7. **Details of Registration.**

Agency	Registration No.	Validity (Date)	Equipment
DGS&D			
DGQA/DGAQA/ DGNAI			
OFB			
DRDO			
Any other Government Agency			

8. **Membership of FICCI/ ASSOCHAM/ CII or other Industrial Associations.**

Name of Organisation : _____

Membership Number : _____

9. **Equipment/ Product Profile (to be submitted for each product separately)**

(a) Name of Product : _____

(Should be given category wise for e.g. all products under night vision devices to be mentioned together)

(b) Description (attach technical literature): _____

(c) Whether OEM or Integrator : _____

- (d) Name and address of Foreign collaborator (if any): _____
- (e) Industrial Licence Number : _____
- (f) Indigenous component of the product (in percentage): _____
- (g) Status (in service/ design & development stage): _____
- (h) Production capacity per annum: _____
- (j) Countries/ agencies where equipment supplied earlier (give details of quantity supplied) : _____
- (k) Estimated price of the equipment

10. Alternatives for meeting the objectives of the equipment set forth in the RFI.

11. Any other relevant information: _____.

12. **Declaration**

(a) It is certified that the above information is true and any changes will be intimated within five (05) working days of occurrence.

(b) It is certified that design and development in indigenous and belong to the _____(Vendor) and/ or _____ (its Indian Sub Vendor). The Indigenous Content in the said equipment is _____ % as on date and likely to be raised to _____% by _____(date). The certification for the same is enclosed.

(c) It is certified that the complete set of design and production drawing are available and source code for all software applications/ programmes are also available with the _____ Vendor and that these would be produced for verification when required.

Note: - Certification for 12(b) and (c) is required only if claiming IDDM category.

(d) It is certified that in the past that _____ (name of firm) has never been banned/ debarred for doing business dealings with MoD/ GoI/ any other Government Organisation and that there is no inquiry going on by CBI/ ED/ any other Government agency against the firm.

Note: - Para 44 and Appendix F of Chapter II of DPP 16 may be referred.

(Authorised Signatory)

**ADDITIONAL INFORMATION PROFORMA
(INDIAN SHIPYARDS)**

1.	Year Established							
2.	Type of Organisation size/ Classification of Yard							
3.	Organisation setup and availability of skilled Manpower							
4.	Details of design, planning and production facilities/ infrastructure including slipways/ dry docks and wet basin/ water front (attach brochures etc.)							
5.	Annual build capacity (in tonnage)							
6.	Details of future expansion and business development planned							
7.	Vessels delivered in last 05 years. (attach previous order copies for similar vessels only)							
	<u>Yard</u>	<u>Customer</u>	<u>Type of vessel</u>	<u>Dwt, grt</u>	<u>Order date</u>	<u>Start production</u>	<u>Contractual delivery</u>	<u>Actual delivery</u>
8.	Orders in hand (attach order copies for similar ships only)							
	<u>Yard</u>	<u>Customer</u>	<u>Type of vessel</u>	<u>Dwt, grt</u>	<u>Order date</u>	<u>Start production</u>	<u>% completed</u>	<u>Expected delivery</u>
9	Financial information (in INR for Indian vendors and in us dollars for foreign vendors)							
(a)	Annual turnover in the last three financial years (year wise)							
(b)	Profits made							
(c)	Net Worth = equity+ reserves							
(d)	Debt/Equity ratio							
(e)	Quick Ratio = (current assets long term debts)/ current liabilities							
(f)	Attach copies of certified published annual report showing turnover and financial status in support of above information							
10	Detailed specifications of STV offered to meet the specified requirements and build period from date of order							
11	Detailed specifications of commercially off the shelf (COTs) STV if available for outright purchase, if any							