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TENDER SPECIFICATION
01 X LANDING CRAFT UTILITY (LCU)
FOR BANGLADESH NAVY

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SER	SECTION	DESCRIPTION	PAGE NO
1.	Part-1	Terms and Conditions	
2.	Part-2	Introduction and General Provisions	
3.	Part-3	Design and Drawing	
4.	Part-4	Hull and Structure	
5.	Part-5	Deck Auxiliary and accommodation outfit	
6.	Part-6	Engineering Machinery, Equipment and Systems	
7.	Part-7	Electrical Equipment, Machinery and Systems	
8.	Part-8	Navigational Equipment/aids	
9.	Part-9	Communication Equipment	
10.	Part-10	Spare Parts, Tools, Test Equipment and Accessories	
11.	Part-11	Accommodation Stores and Amenities	
12.	Part-12	Inspection and Test - Trial	
13.	Part-13	Price and Payment Schedule	



**TENDER SPECIFICATION OF 01 x LANDING CRAFT UTILITY (LCU) FOR
BANGLADESH NAVY**

PART – 1

TERMS AND CONDITIONS

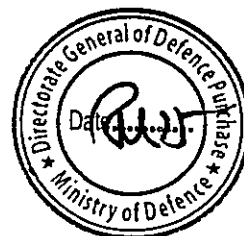
0101. **Preamble.** One Landing Craft Utility (LCU) (herein after called the vessel) is to be constructed for Bangladesh Navy which will be deployed for UN mission in South Sudan. The basic design of the vessel shall either be a proven one or based on a proven one already used by Bangladesh Navy, Bangladesh Coast Guard or other Government Maritime Organization.

0102. **Standard.** The vessel is to be designed and constructed as per the specifications set forth herewith.

0103 **Country of Manufacture of the Vessel.** The vessel shall be built in a Bangladeshi shipyard as per suitable method of construction and transported to designated place (Juba, South Sudan).

0104 **Qualification/ Eligibility of Bidder.** Interested bidder should provide documents indicating that they have the required qualifications and relevant experience to perform the task. The bidder should have the following qualification:

- a. The bidder must be a well reputed and established local shipbuilder having own shipyard/dockyard. The bidder must have experience of building of LCU/LCT/similar crafts for Bangladesh Navy/ Bangladesh Coast Guard within last 10 years.
- b. Experience of docking/undocking including repair and maintenance of various ships and warships of Bangladesh Navy/ Bangladesh Coast Guard for at least last 10 years.
- c. Relevant documents to be submitted from appropriate authority that the bidder is not currently defaulted in payment of bank loan (s); and bidder is not bankrupt or known to be on the verge of being insolvent and/or bankrupt.
- d. Financial solvency is to be proven by submitting relevant documents.
- e. Staffing and logistics of the bidders firm should support technical specialty in warship building and submit relevant documents in support of the claim.
- f. Must submit certified copies of the following documents:
 - (1) Income Tax certificate- for last three financial years.
 - (2) VAT registration certificate.
 - (3) e-TIN certificate.



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0105. **Drawing**. The constructional drawing of the vessel is to contain full details of hull form, scantlings, frames, bulkheads, superstructure, tank arrangement, engine and machinery/ equipment seating, shafting arrangement etc.

0106. **Material and Workmanship**. The hull and structure must be made of steel(marine grade A). The material must be new and of marine quality and built in accordance with the standard shipbuilding practice. Workmanship throughout the vessel will be of the state of art marine standard and shall be according to specified requirements as stated in this document.

0107. **Responsibilities of the Parties Involved**.

a. **Bangladesh Navy (BN)**. The responsibilities of BN is to be as follows:

- (1) To approve appropriate offer proposed by the Shipbuilder.
- (2) To form a Project Implementation Team (PIT) to supervise the construction on behalf of BN.
- (3) To approve all basic drawing such as: General Arrangement (GA) drawing, compartment arrangements (layouts), tank arrangements etc.
- (4) To overview, support and assist test and trial of machinery/ equipment of the vessel conducted by the Shipbuilder.
- (5) To accept the vessel as per contract.
- (6) "Test and trial completion certificate" is to be jointly signed by BN, nominated personnel and the nominated personnel from shipbuilder.

b. **Shipbuilder**. The shipbuilder shall be responsible for the following:

- (1) To provide all drawings related to the vessel.
- (2) To construct hull and structure of the vessel as per the approved drawing.
- (3) To purchase and install all machinery, equipment as per approved drawings and specification.
- (4) To conduct tests/ trials and commissioning of all machinery, equipment, fittings, sensors and systems as necessary with the assistance of the OEM (if necessary).
- (5) To provide the following items from local market (optional), to



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encourage the local backward linkage industries (To be specified in the offer and subject to BN approval):

- (a) All electrodes, gas for welding and cutting etc.
 - (b) All paints, pipes, nut-bolts, clamps, rubber items.
 - (c) Small motors, transformers, pumps, electric cables and switches, DCFF equipment, split type air-conditioners and similar other equipment.
 - (d) Security equipment (lock and key arrangement).
 - (e) Furniture (portable only), paneling and lavatory fittings.
 - (f) Entertainment equipment (like TV, music system, etc.).
 - (g) Mess trap utensils and galley implement.
 - (h) POL items including cooling water, inhibitor, grease, refrigerant and chemicals required for first filling and/or test and trials and/or till handing over to BN along with specification.
 - (j) Any other items small in nature and manufactured in Bangladesh (like flags/ buntings, ships bell, data plaque, safety chains, curtains, sofa covers, bedding items, ships husbandry items etc.)
- (5) "Test and trial completion certificate" is to be jointly signed by shipbuilder, OEM (or OEMS approved agent)/ agent (if there is any) and BN.
- (6) To deliver the vessel to BN at destined or designated port/ city of South Sudan as per contract.
- (7) To provide any item/interface/arrangement required for the standard operation of Landing Craft Utility (LCU), equipment/system, whether the same is mentioned or not.
- (8) To take the responsibilities for all supplies and timely completion of the tasks.
- (9) **Warranty.**
- (a) Warranty for trouble free operation will be provided by the shipbuilder for the vessel and all the supplied items for a period of at least 12 months from the date of acceptance by BN.
 - (b) The warranty should cover all parts and labour (including service engineer's cost throughout the warranty period)



0108. **Submission of the Offer.** The offer/Quotation must include the following:

- a. Complete technical specification of the vessel.
- b. Preliminary General Arrangement (GA) and Midship section drawing of the offered vessel as well as of the proven design.
- c. List of vessel so far built on the proven hull design (based on which the offered vessel shall be built) with names of owners and their present address.
- e. Project work schedule (from the date of signing of contract) from the keel laying or steel cutting to final delivery of the vessel and arrival of major machinery and equipment e. g. main engine, generators, steering gears etc. at the shipyard.
- f. A set of design, calculations and drawings to be submitted which should include the following:
 - (1) Preliminarily layout plan of tanks (POL, freshwater, ballast, etc.) capacity.
 - (2) Preliminary trim and stability information.
 - (3) Preliminary endurance and Sustainability Calculations.
 - (4) Preliminary Electrical Load Analysis.
- g. Certifications on after sale service and guarantee for availability of spares.

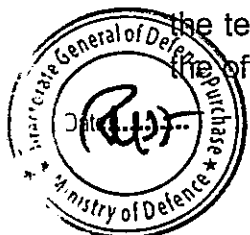
0109. **Project Implementation Team (PIT).** A Project Implementation Team (PIT) shall consist of minimum 1 X BN Officer (Engineering Branch), 1 X CERA/ERA-I/ LME(S) and 1X CEA/EA-I/ LEN. Shipbuilder to provide accommodation facilities to the PIT members during their stay at the shipyard in Bangladesh.

0110. **Total Contract Price and Terms of Payment.** Total Contract Price and Terms of Payment will be as per Part 13.

0111. **Duration of the Project and Delivery.** Duration of Project and Delivery will be as per Part 13.

0112. **Legal and Financial Issues.** All legal and financial issues mentioned in this specification to be fully complied/ agreed by the Shipbuilder. BN shall have the option to cancel the offer in case any such compliance is not agreed upon by the shipbuilder during the process of evaluation and negotiation to finalize the contract specification. Besides, all legal issues are to be governed by DP-35.

0113. **Article Wise Compliance Sheet.** Article wise compliance on the Technical Specification of the vessel is to be provided with the offer. Shipbuilder has to clearly mention whether it complies with the requirements of BN mentioned in various articles of the tender specification or not. For any deviation from that must be clearly mentioned in the offer.



PART-2

INTRODUCTION AND GENERAL PROVISIONS

0201. **Function**

- a. **Primary:** To carry out duties as Temporary Operating Base (TOB) in river water for boats and crew.
- b. **Secondary:** To enable comprehensive logistical transportation, furnish Force Protection (FP), and extend operational reach in riverine water.

0202. **General Descriptions**

- a. Able to operate in the riverine route.
- b. Have a designed life cycle of not less than 25 years.
- c. About 3,000 hrs annual usage.
- d. Normal interval for refit and docking will be 03 (three) years.
- e. Capable of beaching and transporting Landing Force/ contingent along with equipment and stores in river water.

0203. **Ambient Conditions.** The vessel is to be designed to operate in the moist and humid tropical environment of Bangladesh and south Sudan. The conditions are to be as follows:

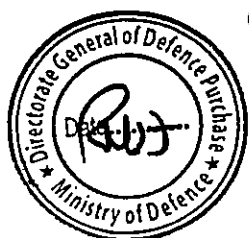
- a. Air Temperature : 10°C to 55°C.
- b. Water Temperature : 25°C to 32°C.
- c. Relative Humidity : Up to 98% (non-condensing).

0204. **Displacement.**

- a. Light weight of the ship : Not more than 160 tons.
- b. Full load displacement : To be mentioned.
- c. Standard load : To be mentioned.

0205. **Dimensions.**

- a. Length (overall) : 25.0 m (\pm 5.0 m).
- b. Breadth : 05.0 m (\pm 1.0 m).
- c. Draught (full load) : Less than 2.0 m.



0206. **Speed.**

- a. Maximum Speed : Not less than 10 knots (at full load condition).
- b. Economic/ Cruising Speed : Not less than 08 knots.
- c. Endurance (at economic speed) : Not less than 1400 km (755 NM).

0207. **Design.** Design of the offered vessel shall either be proven design or based on a proven design that is already used by Bangladesh Navy, Bangladesh Coast Guard or other Maritime Organization.

0208. **Propulsion and Maneuvering.** The propulsion system should consist of the following:

- a. **Diesel Engines.** 02 (two) in number four stroke marine diesel engines (driving two shafts and propellers) capable of developing sufficient power required to attain the maximum ship's speed mentioned in this specification.
- b. **Reduction Gearbox.** 02 (two) in number gearboxes compatible with Diesel Engines shall be installed.
- c. **Number of Shafts.** 02 (two) in number shafts according to the number of main engines propulsion system with reduction gear box. Projection of propeller shouldn't be below keel.
- d. **Steering System.** Steering system including emergency provision are to be supplied.
- e. Associated auxiliary machineries are to be supplied.
- f. 02 (Two) x Shafts with matching FPP

0209. **Power.**

- a. 02 (two) in number Main Diesel Generator (DG) and emergency source of power.
- b. DC power back up (for navigational equipment and communication system/ equipment and emergency backup at sea for at least 30 minutes).
- c. Ship should have provision of taking electrical power supply from shore connection including shore voltage stabilization equipment when ship is at harbor.

0210. **Complement.** The total crew complement is as follows:

- a. 03 (Three) x Officers.
- b. 04 (Four) x Senior Rates.
- c. 13 (Thirteen) x Junior Rates.



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0211. **Accommodation.** Standard accommodation for 22 (03 officers and 19 others) personnel including dining facilities and required toilet/bath facilities for ship's complement with air conditioning system.

0212. **Construction.** All steel materials used for the hull and superstructure will be of Marine grade -A (classification society approved).

0213. **Place of built.** The vessel shall be built in a Bangladeshi shipyard as per suitable method of construction.

0214. **Navigation Equipment/ Aids.** The following navigation equipment shall be provided.

- a. 01 x Navigation Radar.
- b. 01 x Gyro Compass.
- c. 01x Magnetic Compass.
- d. 01 x GPS.
- e. 01 x Echo Sounder.
- f. 01 x Digital Anemometer.
- g. 02 x HD Binocular.

0215. **Communication.** The following communication equipment shall be provided.

- a. 01 X HF (To be provided by BN).
- b. 01 x Marine VHF and 01 x VHF Air band (To be provided by BN).
- c. 06 x Marine VHF Walkie Talkie and 01 x Air Band Walkie Talkie (To be provided by BN).
- d. Signal projector/ Search light: 03 (Three) (One near bridge and two near fox'l)
- e. Visual Signaling Stowage Arrangements (01x Flag Locker & 01x VS Store).
- f. Visual signaling arrangement (08x Black Ball&02x Black Diamond).
- g. 01 x Complete sets of dressing line and two complete set of flags including anchor flag, pennants, ensigns and distinguishing flags.

0216. **Logistics Arrangement.**

- a. **POL.**

- (1) Fuel (diesel), (>10,000 litres), Oil and lubricants stowage for stated endurance, with at least 10% reserve.
- (2) Petrol Carrying Capacity: More than 3000 litres.



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(3) Lub oil stowage for Main engines, Diesel generators, Emergency diesel generator and Gearboxes.

(4) Others as necessary for machinery operation.

b. **Fresh water.**

(1) Not less than 15 tons and provision of a fresh water maker.

(2) Fresh water capacity should be adequate and commensurate with compliment.

c. **Storage Facilities.** Storage facilities for the following are to be provided:

(1) Cargo on deck: Min 20 tons.

(2) Dry provisions for 20 days carrying capacity.

(3) Fresh provisions for 07 days fresh provision carrying capacity.

(4) Tin provision: 07 days.

(5) Standard on board spares for all machinery and equipment, and consumable Naval Stores.

(6) Naval, Engineering, Electrical and Bos'n stores facilities.

d. **Ammunition.**

(1) Appropriate stowage facilities (one magazine) for the ammunition of the armament specified.

(2) Armory, Pyrotechnic Locker and Web equipment store facilities.

(3) Guns and ammunitions shall be provided by BN.

e. **Cooking/ dining Facilities.**

(1) Common galley (cooking) facility for both officers and sailors.

(2) Common wardroom/dinning and recreation facility for all.

(3) Standard mess traps and mess utensils for total ship's complement.

0217. **Miscellaneous.**

a. **DCFF/Emergency requirement.**

(1) Standard damage control and Fire Fighting (DCFF) equipment as per marine standard.



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- (2) Fire detection and monitoring system.
- (3) Standard first aid and limited medical support including medicine storage facilities.
- b. **Life Saving Equipment.** Standard Life saving equipment/items as per SOLAS or equivalent standard are to be provided.
- c. **Other Equipment /facilities.**
 - (1) Standard office equipment (Computer/ Laptop, UPS, Printer etc.).
 - (2) Recreation facilities (Smart Television).
- d. **Documents.** Appropriate drawings, designs, documents, manuals, certificates etc. are to be provided.



PART-3

DESIGN AND DRAWINGS

0301. **Introduction.** The design of the offered vessel shall be either be a proven design or based on a proven design that is already used by any Navy, Coast Guard or other Maritime Organization. The vessel should have the following main features:

- a. Enhanced survivability.
- b. Efficient and accessible layout.
- c. Easy maintenance.
- d. Increased availability of operation.
- e. Cost effective to operate.
- f. Lower life-cycle cost.

0302. **Design Criteria and Standards.**

- a. The LCU shall be designed based on proven hull design. Maximum 10% deviation in dimensional parameters may be allowed. CFD analysis shall be provided while signing the contract.
- b. The proven design shall mean at least 02 (two) proven design ship already built and satisfactorily operated by Bangladesh navy or Bangladesh Coast Guard or government maritime security agency.
- c. All machinery and equipment shall be designed, manufactured and installed in accordance with the requirement of maritime standard.
- d. Vital systems such as propulsion, electric plants and navigation and communication system are to be according to rule.

0303. **List of Drawings.** A complete list of drawings that will be supplied is to be submitted prior delivery of LCU to BN.

0304. **Drawing Package.** 03 (three) copies of each drawing as well as electronic copy are to be supplied. List of drawings are given below:

- a. General Arrangement.
- b. Lines Plan.
- c. Hydrostatic data and Curves.
- d. Preliminary trim and Stability Calculation booklet.
- e. Capacity Plan.
- f. Tank Calibrations.
- g. Inclining experiment report.
- h. Final Trim and Stability booklet.
- i. Midship section drawing.
- j. Drawing of frames.
- k. Aft profile and decks.
- l. Forward profiles and decks.
- m. Aft sections and bulkheads.



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- n. Forward sections and bulkheads.
- o. Shell expansion.
- p. Engine girders/ foundations.
- q. Bulwark construction.
- r. Welding plan/scheme.
- s. Deckhouse and superstructure construction.
- t. Hatch covers and hatch coaming.
- u. Details of rudder construction.
- v. Steering gear arrangement.
- w. Details of propellers and shafting.
- x. Stern tube details.
- y. Anchoring and Mooring arrangements.
- z. Mast details.
- aa. Bollard and fairlead details.
- bb. Ladders, guardrails and stanchion.
- cc. Hatches and Manholes.
- dd. Ventilation arrangement.
- ee. Engine room layout.
- ff. Accommodation arrangement.
- gg. Docking plan.
- hh. Watertight door arrangement.
- ii. Draught mark.
- jj. Bilge piping diagram.
- kk. Firefighting system diagram.
- ll. Fresh water and sea water system diagram.
- mm. Engine cooling sea water and fresh water diagram.
- nn. Fuel oil pipe line diagram.
- oo. Lub oil pipe line diagram.
- pp. Main Engine and Generator exhaust piping diagram.
- qq. Lub oil filling pipe diagram.
- rr. Air vent pipe diagram.
- ss. Sounding pipe diagram.
- tt. Electric lighting circuit diagram.
- uu. Main switch board drawing.
- vv. Chain locker and hawse pipe details.
- ww. Electrical load calculation.

Special note: The list of drawings given above will act as a guideline only. Any other drawings, diagrams and manuals required are to be supplied by the shipbuilder.



PART- 4**HULL AND STRUCTURE**

0401. **General.** The hull and structure are to be designed and constructed in accordance with modern shipbuilding standard. The main hull is to be of single-bottom, continuous main deck, welded steel construction. The superstructure is to be of steel structure, which is to be composed of required layers of deckhouses.

0402. **Hull Structure.** The LCU shall have chinned hull, combined transverse and longitudinal framing systems to enable the LCU to withstand heavy impact forces. The longitudinal structural elements will consist of the plating of bottom, sides and main deck, of central keelson, bottom side girders, side stringers, main-deck girders, bottom longitudinal, bilge, ship's sides, main-deck etc. The transverse main structure will consist of appropriate number of watertight bulkheads and of strong web-frames supporting the longitudinal elements. In designing the framing system, consideration will be given to good drainage of water, ballast and accessibility.

0403. **Hull Materials.** The hull and superstructure will be made of internationally recognized marine class approved shipbuilding quality Marine Grade-A(classification society approved) steel. Appropriate welding material and techniques are to be adopted as per international marine standard.

0404. **Scantling.**

- a. The scantlings of the structural members are to be as per the requirement of the international maritime standard.
- b. The minimum scantlings/ thickness of the following plates are to be mentioned in the quotation:

- | | | |
|------|-------------------|-------------------------------|
| (1) | Side plating | : Min 6 mm (To be mentioned). |
| (2) | Bottom plating | : Min 6 mm (To be mentioned) |
| (3) | Deck plating | : Min 6 mm (To be mentioned) |
| (4) | Bulkhead plating | : Min5 mm (To be mentioned) |
| (5) | Side longitudinal | : To be mentioned |
| (6) | Deck longitudinal | : To be mentioned |
| (7) | Web frames | : To be mentioned |
| (8) | Deck girders | : To be mentioned |
| (9) | Keel bar | : To be mentioned |
| (10) | Superstructure | : To be mentioned |

0405. **Frames.** The frames are to be of one piece from keel to main deck except in the way of tanks. All beams, girders, stringers etc. are to be provided as per scantling shown in respective drawing.



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0406. **Side Longitudinal**. The side longitudinal is to be of one piece as far as possible. All beams, girders, stringers etc. are to be provided as per scantling shown in respective drawing.

0407. **Deck Longitudinal**. The deck longitudinal is to be of one piece as far as possible. All beams, girders, stringers, etc. are to be provided as per scantling shown in respective drawing.

0408. **Bulkheads**. Sufficient numbers of watertight bulkheads are to be provided as required for watertight integrity of the vessel.

0409. **Main and Auxiliary Machinery Seating**. These are to be as per the requirement of maker of the concerned machinery/ equipment.

0410. **Anchor Chain/ Cable Locker**. Self-stowing chain locker of sufficient capacity is to be arranged to stow the cables well clear of the deck. The chain locker is to be watertight.

0411. **Hawse Pipe**.

a. The hawse pipe is to be of adequate diameter and length and be fitted in such a way that free fall of the anchor and easy housing of the anchor shanks and shackles are ensured. The rims of the hawse pipe are to be protected with round bars or castings of good quality.

b. The anchor is to be hung outside the hawse pipe and rested against the bell-mouth of the hawse pipe. Washing outfit is to be provided in the hawse pipe.

0412. **Sea Chests**. Required numbers of sea chests (in main and auxiliary machinery spaces) are to be integrated in the hull bottom construction. Each chest is to be provided with a dismountable galvanized grating flush attached with the bottom and a vent hole at the top as well as a drain hole at the bottom.

0413. **Construction of Tanks**. The fuel oil, lube oil, freshwater, dirty lube oil, sewage tank, ballast tank etc. is to be integral part of the hull as far as possible and is to be constructed according to shipbuilding standard.

0414. **Superstructure**.

a. The superstructure including its closed bridge is to be constructed by marine steel grade A. The superstructure will be welded to the deck.

b. Superstructure is to be transversely stiffened and inside division bulkheads will be of vertically stiffened flat type or wedged type where suitable.

c. Arrangement of internal webs, pillars and steel bulkheads will be specially considered to minimize vibration.



0415. **Gun Posts and Storing Arrangements.** The following gun post with necessary supporting structure and storing arrangement shall be provided. The Gun and ammunitions shall be provided by BN.

- a. **Gun Post.** 02 x 12.7 mm HMG
- b. **Small Arms Storing Arrangement.**
 - (1) 16 X SA/CSMG
 - (2) 02x LMG
 - (3) 02 x Pistol
 - (4) 02x Signal Pistol

0416. **Ammunition Stowage.** Magazine locker equipped with suitable stowing facility for ammunitions are to be made as convenient.

0417. **Primary Surface Preparation and Shop Priming.** Steel plates and sections are to be cleaned and cleared of mill scale by blast cleaning and coated with a primer prior to fabrication. The shop primer shall not be harmful to the welding work and will be compatible to the subsequent coatings.

0418. **Painting.**

- a. Full scheme of epoxy coating of International Paint/ SIGMA/ JOTUN or equivalent is to be applied in the underwater area. Suitable full scheme conventional paint is to be used in other areas as acceptable to BN.
- b. Fuel oil, lube oil, sewage tanks and bilges areas are to be painted with appropriate conventional paint scheme.
- c. Fresh water tanks are to be painted with internationally recognized paint manufacturers' recommended paint scheme. The paint is to be as per appropriate scheme of paint for using inside of fresh water tanks.
- d. Non-skid paint is to be applied on weather decks (walkway).
- e. Epoxy primer, anti-corrosive (minimum two coats) and anti-fouling (minimum two coats) paint is to be applied for the outside of main hull under waterline and appendage.
- f. Conventional anti-corrosive primer and finish paint is to be applied on the outside surface of main hull above waterline, on the decks and on the inside and outside surfaces of the deckhouses.
- g. Anti-corrosive paint is to be applied for black anchor equipment. Conventional anti-corrosive primer and black finish paint is to be applied for towing and mooring equipment.



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h. Other places are to be coated with corresponding paints as per different requirements.

0419. **Cathodic Protection.** Adequate numbers of Zinc anodes, as required by calculation, shall be fitted to protect the underwater hull and fittings.

0420. **Insulation and Deck Coverings.**

a. **General.** All appropriate spaces/ compartments are to be laid with insulation. Insulation of living and control spaces (including lobbies) shall be covered by face plate/ lining or ceiling panel. Exposed side of insulation, except in the engine rooms and where not covered by face plate/ lining or ceiling panel, shall be covered by flame-retardant white cloth with flame retardant white paint.

b. **Insulation.** Mineral wool (or better) shall be laid on tops and side walls of the living and control spaces exposed to sun ray. The tops and walls of Engine Rooms and Galley shall be laid with insulation material.

c. **Face Plate/Lining and Ceiling Panel.**

(1) **Living and Control Spaces.** Tops are to be covered by Light Ceiling Boards (or better) and the walls/ bulkheads is to be covered by plywood (or better).

(2) **Galley.** Tops and bulkheads are to be covered by S.S sheet (or better).

(3) **Deck Coverings.**

(a) All deck coverings in the galley, wash places, toilet spaces shall be of non-slip ceramic tiles laid on cement base.

(b) All accommodation spaces, office, lobby and are to be covered with approved type painting.

0421. **Signatures.** All signatures (noise, thermal, radar, etc.) is to be kept as minimum as possible. Sharp bend (right angle) of super structure/high temperature object on upper deck is to be avoided. The shafting and propellers are to be designed for low noise. All heavy vibrating machinery is to be mounted on special noise absorbing mounts.

0422. **Hull Designation and Markings.**

a. **Location and Access Closure Numbering.** All compartments, doors, hatches, manholes, scuttles, etc. is to be numbered in accordance with basic location numbers as per naval standard.

b. **Draught Marks.** Draught marks are to be placed at appropriate places at both sides of the bow and the stern.



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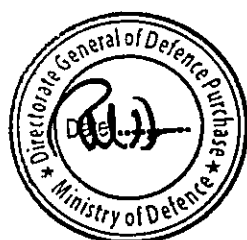
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- c. **Ship's Number and Distinguishing Marks.** The vessel's number and distinguishing marks is to be provided along with the Name Box in Bengali and in English.
- d. **Builders Data Plaque.** 02 (two) in number cast or engraved bronze plaque in English and Bengali is to be provided.
- e. **Warning, Operating and Instruction Plates.** In addition to plate required for particular applicable specifications, warning (such as various safety warnings), operating and instruction plates etc. are to be installed as required.
- f. **NBCD Marking.** NBCD and gas tight markings are to be marked as per naval standard (BR 2170). These markings are to be guided by BN authority.
- g. **UN Marking.** UN marking is to be provided according to UN requirement.

0423. **Special Features.** 01 (One) in number bow ramp capable of carrying 20 tons. Built in hard points with accessories for securing cargo and boats. The ramp also needs to be operated by electrically operated winches to be installed at forward end of the vessels.

0424. **Payload.**

- a. 20 Crew + 12 Persons (Necessary sitting arrangement for land force protection team).
- b. Cargo Carrying Capacity: 20 tons.



PART- 5

DECK AUXILIARY AND ACCOMMODATION OUTFIT

0501. **General.** This Part describes the general specification and requirement for deck fittings, deck auxiliary, deck machinery, safety appliances, firefighting and damage control, accommodation outfit etc.

0502. **Weather Protected Assembly.** The assembly of all equipment, the painting and other sensitive activities shall take place in a covered working area, protected from weather influences.

0503. **Workmanship and Quality of Materials and Fittings.** The workmanship on the hull and fittings throughout shall be completed by shipbuilder in accordance with applicable standards. Care shall be taken by shipbuilder to ensure fair lines, smooth surfaces and neat welding. The shipbuilder shall have to maintain high standard regarding clean-keeping, safety and environmental protection during outfitting of marine grade goods, materials and equipment.

0504. **Fittings.** All bolts, chains, fittings and other small equipment exposed to seawater shall be of stainless steel or aluminum or at least of galvanized steel. Use of silicon-based materials shall be minimized.

0505. **Watertight Doors.**

- a. Watertight steel doors secured with wedge clips and handle for working them on both sides of the bulkhead is to be fitted to all external accesses.
- b. The doors are to be provided with seals, gaskets and clamping devices and the doors shall be so arranged that those can be operated from both sides of the bulkheads.
- c. Hook clips or catches is to be fitted for fixing the doors when open. The steel hinges shall have brass pins and is to be equipped with a grease nipple for lubrication.
- d. Doors to store rooms and similar compartments shall have their hinges with hinge pins clenched.
- e. Padlocks are to be provided where necessary.
- f. Clear height of doors from deck covering, numbers of clips, depth of seals on different doors, etc. is to be in accordance with shipbuilding standard.

0506. **Miscellaneous Non-Watertight Doors.**

- a. Access to all offices and accommodations, etc. is to be fitted with hinged nonstructural doors.



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- b. The doors shall be arranged to open into the spaces they serve.
- c. Ventilator openings on the lower half of the doors, as per standard practice are to be provided.
- d. Joiner doors is to be without coaming except were located on the structural bulkheads or on the bulkheads bounding wet spaces.
- e. Door closure and other fittings is to be fitted only on joiner doors to all air-conditioned spaces only.

0507. **Hatches.**

- a. All hatches are to be watertight with coamings and covers where necessary. They are to be stiffened to withstand the test pressure of the compartment to which they are fitted.
- b. Hatches is to be fitted complete with clips, wedges, hinges, guards, chains and all other fittings as required.
- c. Hatches to store rooms and other spaces which are not normally occupied are to be fitted with butterfly nuts and hinged clips.
- d. Hatches required for escape purposes are to be fitted with wedges and clips worked by handles both above and below the hatch.

0508. **Manholes and Manhole Covers.**

- a. Manholes made of steel are to be fitted to give access to tanks, watertight compartments and similar inaccessible spaces. The manhole covers are to be watertight or oil tight as necessary.
- b. The manhole covers are to be secured with gaskets and stainless-steel bolts and nuts as necessary.
- c. Label plates are to be fixed on all covers giving the name of the compartments to which they give access.

0509. **Windows.**

- a. All windows are to be made of aluminum alloy anodized frame with heat treated safety glass. These may be of fixed type or opening hinged type.
- b. Window wipers are to be fitted for the center window only.
- c. 02(two) in number Clear view screens are to be fitted on both starboard and portside of front windows in the Bridge.



0510. **Side Scuttles and Portholes.** Standard side scuttles and portholes are to be fitted as per general arrangement drawing and including the following:

- a. All side scuttles shall have Brass/Al framed with steel hinged deadlight cover.
- b. All operable type portholes are to be made of Brass /Al frame.

0511. **Plan for Doors, Windows and Openings.** Doors, windows, portholes, deck openings, etc. has been shown in the accommodation plan.

0512. **Ladders.**

- a. Suitable inclined ladders and vertical ladders are to be installed as required.
- b. All metal footsteps are to be of non-slip type for slip resistance.
- c. Accommodation is to be provided with climbing steps and handgrips.
- d. Standard ladders are to be provided with suitable rails and non-skid footsteps. All inclined ladders are to be fitted with the hand-rails.

0513. **Rails and Stanchions.** Steel handrails, guardrails, storm rails and stanchions are to be provided

0514. **Floor Plates and Gratings.** In machinery spaces and stores, nonskid aluminum/steel floor plates and gratings are to be provided for access and easy maintenance.

0515. **Fenders.** Special attention shall be given to the arrangement, materials and fastening of the fenders. Fenders shall be positioned in accordance with the General Arrangement Plan and shall be of high-quality products, selected for durability.

0516. **Mast.** The main mast is to be of fabricated steel and is to be erected at the after side of the bridge top deck. The mast is to be strong enough to hold communication equipment, flags, etc. Necessary blocks, yardarm, hooks, fittings, provision for extra yardarm is to be incorporated in the mast. The deck structure is to be sufficiently stiffened to bear the load and vibration of mast during the rough weather condition. Mast should have folding provision for navigating under any bridge on river White Nile or within area of operation (AO).

0517. **Jack Staff and Ensign Staff.** Collapsible jack staff and ensign staff of steel pipe with necessary fittings is to be provided at bow and stern respectively. Hooks is to be made and fitted with staffs for rigging dressing lines and the flag.

0518. **Navigation Light Boxes.** Two sidelight boxes are to be provided for housing of port and starboard navigation lights.



RESTRICTED

0519. **Air Inlet Gratings.** Engine Room ventilation air inlet gratings and outlet gratings are to be suitably placed.

0520. **Air Dust Covers.** Arrangement for closing the inlet and outlet gratings for ventilation of the Engine Room shall either be made inbuilt or be made with watertight steel/aluminum covers.

0521. **Bollards.**

a. Required number double head type bollards is to be fitted on the fore and aft deck on each side as convenient. It is to be of welded construction with good quality steel casting.

b. All bollards are to be provided with suitably placed fairleads of good quality steel casting.

0522. **Fairleads.** Adequate numbers of suitable fairleads are to be provided. The fore and aft fairleads are to be suitable for receiving the mooring lines and towing ropes.

0523. **Cleats and Eyebolts.** Sufficient number of cleats, eyebolts, ring bolts and other fittings of required capacity necessary for attachment, working, belaying and securing of all parts and appliances is to be fitted at appropriate locations.

0524. **Mooring/ Berthing Hawsers.**

a. 04 (four) in number coils of Berthing hawsers are to be supplied.

b. 06 (six) in number heaving are to be supplied.

c. 04 (four) in number Rat Guards are to be supplied.

0525. **Riggings.** Sufficient halyards in the main mast are to be catered for hoisting flags.

0526. **Locks, Keys and Tags.** All doors, hatches, etc. is to be provided with locking arrangement (padlocks or rim-locks) along with key rings and identification tags.

0527. **Keyboards.**

a. 01 (one) number Important keyboard with key hooks and identification tags is to in be fitted in the captain's cabin.

b. 01 (one) in number General keyboard is to be fitted in the diningroom.

0528. **Lifesaving and Safety Appliances.** The vessel is to be provided with standard life saving appliances as per SOLAS convention. Following must be supplied:

a. **Life Rafts.** 02 (two) in number 16 men capacity inflatable life rafts with cradle and accessories are to be provided



RESTRICTED

b. **Lifebuoys, Lifejackets and First Aid Kit.** Sufficient numbers of life buoys, life jackets, survival suits, signals, First Aid kit etc. for onboard personnel is to be provided as per SOLAS standard.

0529. **Firefighting.**

- a. Suitable firefighting system for engine room and galley should be there.
- b. **Fire Main System.** A sea/river water fire main system with sufficient number of fire hydrants is to be laid in the LCU with dedicated robust fire pumps attached with hydrants throughout the ship.
- c. **Fire Hose and Nozzles.** Every fire hydrant is to be provided with adequate length of fire hose with end couplings and combined spray-jet nozzle stored in boxes in suitable place nearby.
- d. **Portable Fire Extinguishers.** Required number of portable fire extinguishers, fire extinguishing ball and refills for extinguishing solid, liquid and electric fire are to be provided. Minimum 50kg ABC and AFFF are to be provided in the engine room and galley.
- e. **Portable Firefighting Pump.** 01 (one) in number portable diesel firefighting pump with appropriate capacity with accessories is to be supplied.
- f. **Fire Detection and Monitoring System.** Standard fire detection systems with alarm are to be provided in accommodations areas, bridge, office and machinery space.

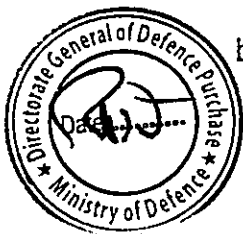
0530. **Damage Control Equipment.** Following damage control equipment are to be supplied:

- a. 01x electrically driven (as per generator's output voltage and frequency) submersible pumps of 2 tons/hour capacity respectively with accessories.
- b. 01x sets of damage control equipment, tools and materials.
- c. 02x portable emergency lamps (Re-chargeable).

0531. **Flag and Visual Signaling Arrangement Locker.** 01 (one) in Nos flag lockers with 70 pigeon holes and 01 (one) in number visual signaling arrangement locker of suitable size are to be fabricated and fitted on the upper deck near to the mast.

0532. **Miscellaneous.** Following items are to be supplied:

- a. 01 (one) in number three tier steps is to be provided for using at the end of gangway ladder during high/low water when the ship is alongside jetty.
- b. Watch and station bill board in the lobby.



RESTRICTED

- c. Emergency cutting gears (such as axe in forecastle and after deck).

0533. **Deck Machinery.** Deck machinery is to be provided as per equipment number calculation for this vessel.

0534. **Anchor and Chain Cable.**

- a. 01 (One) in number stockless anchor of adequate size with necessary chain cable and other accessories and strong back is to be provided.
- b. The anchors are to be hung at fore side of the vessel outside the hawse pipe and rested against the bell-mouth of hawse pipe. Anchor is to be equipped with appropriate size of stud link chain, which is to be stored in the chain locker.
- c. 01 (one) in number kedge Anchor with sufficient rope is to be provided at the stern which can be operated manually for maneuvering of the vessel.

0535. **Steering Gear System.**

- a. 01 (one) set electro-hydraulic steering gear system of appropriate capacity and design for double plated twin rudders will be installed in the steering gear room. Primary steering will be from bridge and secondary steering position located in the steering gear room. The steering system will be operated with ship's main power supply.
- b. **Rudder angle indicators.** Rudder angle indicators will be installed in the Bridge and Steering Gear room.
- c. **Emergency Steering Gear.** Necessary arrangements will be fitted for emergency steering in case of system failure.

0536. **Stores and Lockers**

- a. Seamanship gears store/locker.
- b. Technical Store/locker.
- c. Naval Store/locker.
- d. Provision for limited general store.
- e. Magazine, Armory, pyrotechnic locker, web equipment and DCFF store.



PART-6**ENGINEERING MACHINERY, EQUIPMENT AND SYSTEMS**

0601. **General.** The vessel shall be equipped with twin screw (two-unit) diesel propulsion system. Each propulsion unit shall comprise of a marine diesel engine, resilient coupling, one gearbox, one shafting, one fixed pitch propeller and relevant accessories. In addition, a control and monitoring system shall be installed for the total propulsion system of the vessel. The main engines shall be controlled remotely from the Bridge and locally from the Engine Room. Important parameters, such as, speed, pressure, temperature, etc. shall be displayed for monitoring from the Bridge and the Engine Room. The engine room shall be designed to make easy operation and maintenance with good accessibility for inspection and routine service.

0602. **Propulsion System.**

- a. The propulsion system shall consist of two marine diesel engines, reverse reduction gearboxes, stern gears including shafting, Fixed pitch propellers, stern tubes along with bearings, A/P brackets etc. as necessary and propulsion control system (inbuilt gauges).
- b. All propulsion components shall be rated for not less than the full engine power and the installed gearboxes and the stern gears shall be capable of transmitting the full power and torque of the engine and the thrust of the propulsion system from FULL AHEAD to FULL ASTERN.
- c. Each engine shall be connected to one reverse reduction gearbox. The gearboxes should have trailing capability for unlimited period. If required, extra trailing pump/cooling arrangement is to be provided.
- d. Each reverse reduction gearbox shall be connected to one propeller shaft.
- e. The propulsion control system shall be able to provide centralized control and monitoring from the Bridge. Provision shall be kept to operate and engage engines with gearboxes locally in the Engine Room.

0603. **Propulsion Equipment Prerequisites.** All major propulsion system components, including engines, gearboxes, stern gears (shafting, propellers, stern tubes along with bearings, 'A/P' brackets, etc.) and control system shall be from a current production series.

0604. **Technical Specification of Main Engines.** The LCU shall be propelled with 02 in nos Main Engines. The main engines should meet the following technical specification:

a.	Model / Type	:	To be mentioned
b.	Make	:	To be mentioned
c.	Country of Origin	:	To be mentioned



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d.	Country of Manufacture	:	To be mentioned
e.	Year of Manufacture	:	2024 or later
f.	Cycle	:	4 Stroke
g.	Aspiration	:	Turbo charged and after cooled
h.	Fuel Injection	:	Direct fuel injection
j.	Cooling	:	To be mentioned
k.	Numbers of Cylinder	:	To be mentioned
l.	Bore and Stroke	:	To be mentioned
m.	RPM	:	To be mentioned
n.	Maximum Continuous Rating (MCR)	:	To be specified for each engine, at 45°C air and 32°C seawater temperature. Engine performance curve has to be submitted with the offer
p.	Maximum Rated Power	:	To be mentioned
q.	Idling rpm	:	To be mentioned
r.	Time between Top Overhaul	:	To be mentioned
s.	Time between Major Overhaul	:	To be mentioned
t.	Lub oil to be used	:	SAE 15W 40 or equivalent
u.	Dry-Wet weight (kg)	:	To be mentioned
v.	Dimension in meter	:	To be mentioned

0605. Maintenance Facility.

- a. All engines/accessories should be facilitated for easy removal and reinstallation.
- b. The layout of all machinery and system should be such that they provide easy access for routine and onsite maintenance.
- c. All propulsion engines, generators and emergency power backup are to have lifting eyes on top for using chain blocks for removal and re-installation of heavy components. Necessary, I- beams are to be provided.

0606. Machinery Control, Monitoring and Alarm System. Details of machinery control, monitoring and alarm system shall be as follows:

a. **Machinery Control.**

- (1) Arrangement shall be provided to control the propulsion machinery from Engine Room and Bridge.



RESTRICTED

(2) Local control of the propulsion diesel engines and gearboxes shall be provided on the machinery for emergency operation, in case of failure of machinery control and alarm system.

(3) Provision shall be made for starting and stopping the propulsion diesel engines from Bridge with local starting and stopping facilities. Emergency stop control of engines shall be provided in the Bridge and on the engines (Locally).

(4) Control of the generators shall be provided from the switchboard located in Engine Room.

(5) Starting and stopping of each generator shall be provided from a panel mounted adjacent to each set.

b. **Monitoring and Alarm System.** The monitoring and alarm system should comprise a number of alarms for the engines and auxiliary machinery and shall be located in the Engine Room or Bridge. Each alarm shall be presented by audible and visual signal with a test and acceptance push button. Following safety devices shall be provided:

- (1) Low lube oil pressure alarm.
- (2) High cooling water temperature alarm.
- (3) High lube oil temperature alarm.
- (4) Engine over speed alarm.
- (5) Emergency stop button is to be provided.

0607. **Engine Load Test.**

- a. Engine load tests up to maximum permissible limit and time are to be carried out in the factory premises as per manufacturer standard procedure.
- b. All documents related to engine load test are to be provided.

0608. **Fuel System.** The proposed fuel system should include the following:

- a. Engine driven fuel delivery pump with motor driven fuel priming pump.
- b. Fuel pre-filter and fuel duplex filter with changeover valve.
- c. Individual cylinder fuel injection pumps/Unit injector with emergency shutdown device with the engine and at the remote-control panel.
- e. Fuel oil pressure and temperature gauge.



RESTRICTED

0609. **Lubricating Oil (LO) System.** Proposed propulsion engines and gearboxes are to use same type of lubricating oil. The lube oil system for diesel engines and gearboxes are to be arranged in accordance with the requirement of the manufacturers. Lubrication system is to be 'wet sump' type.

0610. **Cooling Water System.** Engine internal cooling is to be done by freshwater with coolant additives (anti corrosive chemicals). Cooling of this freshwater is to be done by seawater through heat exchangers.

0611. **Shutdown System.** Engine shutdown system shall include the following:

- a. Normal shutdown via injection pumps from local as well as the remote-control panel.
- b. Emergency shutdown via emergency push button.

0612. **Exhaust System.** Among other, the system should have the following:

- a. Provisions for monitoring exhaust temperature of combined cylinders.
- b. Expansion bellows between turbocharger and main exhaust pipe.
- c. Exhaust silencers & exhaust flaps.

0613. **Mountings.** Following shall be supplied with each main engine:

- a. Required number of shock and vibration mountings.
- b. Combined bed plate to match with engine seating.
- c. Lifting eyes.

0614. **Gearbox.** Details of gearbox are as follows:

- a. Each main engine is to drive one propeller via a reverse reduction gearbox.
- b. Engine, gearbox and propeller shafts shall be mounted 'in-line'. The gearbox shall be flanged to the engine and shall take the axial thrust.
- c. **Clutch Control.** Each clutch shall be operated remotely and emergency clutch control mechanism shall also be provided on the gearbox.

0615. **Propeller.** Fixed Pitch Propeller (FPP) Nickel-Aluminum-Bronze alloy or any other suitable better material shall be fitted.

0616. **Shafting.** Technical particular of the shafting is to be as follows:

- a. **Propeller Shaft.** Propeller shafts are to be made of high-quality stainless steel/ Forged Steel.



RESTRICTED

- b. **Stern Tube and Brackets.** Each stern tube is to be made of a thick-walled steel pipe, which is to be welded to the hull and be supported aft by brackets. The stern tube is to be seawater cooled and provided with appropriate sealing glands fore and aft.
- c. **Propeller Shaft Sealing.** The stern tube is to be sealed fore and aft by grease lubricated radial sealing rings as necessary.
- d. **Stern Tube Lubrication.** The stern tube is to be lubricated by seawater.
- e. **Turning Device.** Arrangement is to be made to turn propeller shaft.

0617. **Thrust block.** Thrust block shall be required if the gearboxes do not have inbuilt thrust bearing to take axial propeller thrust. However, gearboxes with inbuilt thrust bearing are preferred.

0618. **Remote Control from Bridge.** Control desk for both engines and gearboxes are to be positioned in the Bridge. The control desk is to be equipped with the following instruments:

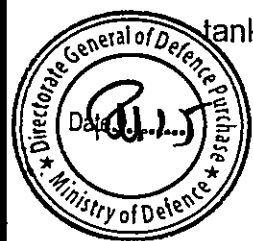
- a. Engine speed control throttles/levers.
- b. Main engine rpm indicators.
- c. Gearbox control levers for ahead, astern and neutral position for both gearboxes.
- d. Engine stop switches.

0619. **Freshwater System.** The fresh-water capacity should not be less than 15 tons. Standard arrangements of overhead tank with necessary pumps and associated piping arrangement are to be provided.

0620. **Sewage System.** Sewage Treatment Plant is to be provided with sufficient storage capacity to support waste handling for 30 personal.

0621. **Bilge and Deck Wash System.** The engine room, steering gear compartment, and void tank are to be provided with a suction line, each connected to the fire and bilge manifold in the engine room. The fire and bilge pumps should have suction connections on a sea water inlet and is to be provided at the pressure side with one storm valve in the engine room, at the main deck and at the fox'cl deck for firefighting/ deck wash purpose. The bilge suction should be fitted with galvanized suction strainer. Same pumps will be used to maintain pressure in the fire main line.

0622. **Fuel Oil Tank(s) and System.** The fuel tank capacity is to be such that the desired endurance can be achieved by expending fuel down to suction level. The fuel oil tanks are to be connected via pipes and valves. The system is to consist of the following:



RESTRICTED

- a. One in no fuel transfer pump to transfer fuel oil between the tanks.
- b. One in no strainer of simplex type at suction side of each pump.

0623. **Lubricating Oil Tank(s) and System.** Propulsion engines, diesel generator engines and gearboxes shall use same type of lubricating oil (SAE 15W40 or equivalent, which must be available in Bangladesh). The lubricating oil system for diesel engines, generators and reduction gearboxes is to be arranged in accordance with the requirement of manufacturer.

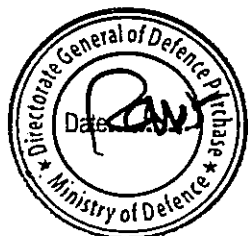
0624. **Air Conditioning and Ventilation.** Arrangement of air conditioning and ventilation system is to be as follows:

- a. **Air Conditioning.** Split type Air-conditioning units are to be installed onboard the vessel to provide conditioned air for accommodation dining/ recreation room, closed bridge, office spaces etc. Power requirement for these systems is to be catered with the gen sets.
- b. **Ventilation of Engine Room.** Appropriate arrangement shall be made for engine room ventilation (considering ambient condition). Exhaust blowers of adequate capacity shall also be fitted in the engine room.
- c. **Ventilation of Galley and Sanitary Spaces.** Supply and exhaust blowers of adequate capacity are to be fitted in convenient places for proper ventilation of galley, sanitary spaces etc. (i.e. the spaces which are not air conditioned).

0625. **Refrigerators and Deep Fridges (Freezers).** 02 (two) in number domestic refrigerators and 02 (two) in number domestic deep fridge (freezer) and adequate capacity (fresh provision for minimum 07 days) is to be fitted at suitable places onboard the vessel.

0626. **Piping.** Piping of various systems shall meet the following requirements:

- a. All piping of different systems is to be installed and tested by the builder in accordance with the relevant rules.
- b. The dimension of pipes, valves and fittings is to be in accordance with the relevant rules/ standards unless otherwise specified.
- c. Adequate pipe supports is to be suitably located to take the weight of the piping, insulation and lagging as appropriate. Supports shall carry the loads imposed by expansion/ contraction of the piping and prevent excessive vibration under all operating conditions.
- d. Unless absolutely necessary, flanges or screwed joints are not to be located over electrical equipment.
- e. They are to be strong enough to hold the pressure and perform as intended.



RESTRICTED

- f. Pipes are to be marked with color bands for identification.
- g. Temporary strainers are to be installed in the lubricating oil piping for cleaning and flushing the system.
- h. Materials of different piping system is to be as follows:
- | | | |
|-----|--------------------------|--------------------------|
| (1) | Freshwater system | : Galvanized steel |
| (2) | Scupper and drains | : Galvanized steel |
| (3) | Fire Main system | : Galvanized steel |
| (4) | Bilge system | : Galvanized steel |
| (5) | Domestic seawater system | : Galvanized steel/ PVC. |
| (6) | Fuel oil system | : Seamless steel pipe |
| (7) | Lube oil system | : Seamless steel pipe |
| (8) | Hydraulic system | : Seamless steel pipe |

0627. **Heat Exchangers.** Heat exchangers shall meet following requirements:

- a. **Engine Fresh Water Cooler.** Tubular heat exchangers (or better) of adequate capacity suitable for tropical environment is to be installed with each main engines and diesel generator engines. The heat exchangers shall have water supply from the sea chests. Provisions of opening the chests for inspection are to be made. Detailed information about the type of cooler is to be provided.
- b. **Lubricating Oil Coolers.** Lubricating oil coolers of adequate capacity is to be incorporated in each engine layout and gearbox.

0628. **Air and Exhaust Arrangement.**

- a. The turbo- chargers shall obtain air suction via air filters from the well-ventilated engine room.
- b. Exhaust gases from main engines and diesel generators shall led to the atmosphere via a dry/wet type exhaust silencer to ships side.
- c. Expansion pieces are to be arranged for exhaust systems where necessary. The exhaust system is to be insulated with about 50 mm thickness wool with galvanized steel with suitable portable arrangement in way of flanges and expansion pieces.
- d. Suitable thermometers/pyrometers are to be fitted into the air inlet and exhaust lines.



RESTRICTED

0629. **Filling, Sounding and De-aeration System.** Injection piping, air vent, measure piping is to be equipped for each of FWT, FOT and lube oil tanks.

0630. **POL and Chemicals.** Sufficient quantities of the following items are to be provided for the first time filling to run the machinery for all sorts of test and trial and till handing over of the vessel to BN:

- a. Fuel Oil.
- b. Lubricating oil for main engines, Diesel generators and Gearboxes.
- c. Special purpose greases.
- d. Cooling water inhibitor for main engines and diesel generators



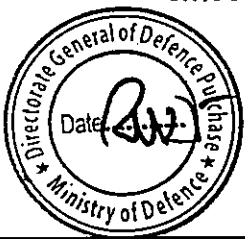
PART-7

ELECTRICAL MACHINERY, EQUIPMENT AND SYSTEMS

0701. **General.**

- a. All electrical systems, equipment, machinery, fittings, fixtures, items, cables, wiring etc. shall comply with recognized marine standard.
- b. Electrical equipment shall be appropriate for tropical environment and shall have Class F insulation unless otherwise stated. The maximum allowable temperature rise on all electrical equipment and wiring shall be based on an ambient temperature of 55°C and humidity of about 98% RH.
- c. Machinery temporarily or permanently exposed to the outside atmosphere or water shall have IP55.
- d. Electrical equipment shall be designed and located for easy access for repairs and removals. Equipment shall be located so as to minimize damage.
- e. The casings of all electrical machine/equipment shall be properly earthed (grounded) and earthing points shall also be provided for portable electrical equipment as per manufacturer's requirement.
- f. All wiring, cables, breakers, distribution panels, machines etc. shall be clearly labeled and systematically coded for ease of identification.
- g. Necessary documents, drawings, circuit diagrams of all electrical and electronic items including the detailed description of the items are to be provided.
- h. Red, Yellow and Blue colors shall be used to identify 3 phases of cables, bus bars, terminals etc. of AC circuit.
- i. Red and Black colors shall be used to identify positive and negative polarity of cables, bus bars, terminals etc. of DC circuit.

0702. **Ship's Main Power System.** The Main power system shall be designed and developed as a complete solution for the vessel to run at full efficiency both at sea on own power of 415V AC, 50 Hz, 3 Phase (without conversion) and at harbour on national power supply system of 400V-440V AC, 50Hz, 3 Phase. Accordingly, all electrical machinery for use at harbor should be so designed. In case of precision equipment sensitive to voltage and frequency change required for harbour use, two sets of converters, one for running at required harbour load (as per load calculation submitted by the bidder) and another standby of same capacity, along with other necessary gears shall be installed onboard. Auto change over switches is to be installed for the sensitive and important equipment for smooth uninterrupted operation.



0703. **Schematic Diagram.** Schematic diagram of electrical distribution system of the ship is to be provided with the offer.

0704. **Electrical Load Analysis.** Electrical load analysis shall include the following Enclosed herewith.

- a. Maximum operational load (when all system and armament are operating).
- b. Cruising Load.
- c. Load at anchor.
- d. Shore Load.
- e. Emergency Load.

0705. **Provision of Power for Future Equipment.** 10% reserve provision of all kinds of electrical power is to be arranged for future installation of machinery/equipment.

0706. **Equipment and Items of Electrical System.** Equipment and items of the electrical system, which are to be supplied, are as follows:

- a. Two in number Main Generators with appropriate capacity and associated accessories.
- b. One in number Main Switchboard with synchronizing panel and necessary meters.
- c. Distribution Panel / Switches as required.
- d. Required number of motors, pumps, supply and exhaust fan and auxiliary machineries as required.
- e. **Conversion Machinery.**
 - (1) Required number of Transformers from generators 415V/220V AC and shore supply 400V- 440V/220V AC with kVA ratings.
 - (2) Rectifiers for 24V DC as required for various sensitive equipment and sensors of appropriate capacity.
- f. **Shore Supply Arrangement.** A cable and connection for shore power supply (Ship along sides supply arrangement) with breaker is to be provided. The cable shall be fitted with a male plug on the shore side and female plug on the vessel side. The shore power supply connection is intended to provide power to the ship, up to the current given below.

- (1). Current : 80-120 Amps



- (2). Voltage : 415 V
- (3). Frequency : 50 Hz
- (4). Length of cable : 100 m

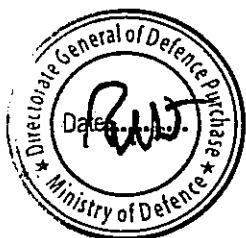
g. **DC Power Backup.**

- (1) DC power backup (for engine control system, navigational equipment and communication system/ equipment at sea for at least 30 minutes.
- (2) Required numbers Batteries for General Use and Communication system is to be provided.
- (3) Battery capacity is to be calculated so that emergency use battery may operate the services for at least 30 minutes continuously. Communication battery shall also be suitable for 30 minutes operation.
- (4) Battery Chargers as required is to be provided.

0707. **Main Generator Sets.** An electrical power generation system consisting of two identical powered marine type three-phase generators is to be installed. Each generator sets shall be capable of taking 100% ship's and additional 10% ship's load. The generator sets are to be fitted with instrument panels and emergency shutdown devices. Two generator sets are to be fitted with instrument panels and all standard safety devices. The requirements of the generators are outlined below:

a. **Specifications of Main Generating Set.** Each generator set is to be of following specification:

- (1) Brand : To be mentioned
- (2) Model : To be mentioned
- (3) Rated power : To be mentioned
- (4) Country of origin : To be mentioned
- (5) Country of manufacturer : To be mentioned
- (6) Year of manufacturer : 2024 or later
- (7) **Coupling.** Double bearing alternator is to be flanged to the prime mover (engine) through flexible coupling.
- (8) **Combined Base Frame.** The prime mover and the alternator of each generator sets shall be mounted on a combined base frame and rigidly fixed to the generator seating. Lifting eyes shall be provided for lifting the complete generating set as a whole and also the engine and the alternator separately.



b. **Specification of Prime Mover (Diesel Engine) for Generators.**

- | | | |
|------|-----------------------------|---------------------------------------|
| (1) | Brand | : To be mentioned |
| (2) | Model | : To be mentioned |
| (3) | RPM | : To be mentioned |
| (4) | Combustion | : Direct fuel injection. |
| (5) | Cooling system | : Water/Air cooling (To be mentioned) |
| (6) | Starting System | : Battery starting |
| (7) | Cycle | : 4 Stroke |
| (8) | Country of origin | : To be mentioned |
| (9) | Country of manufacturer | : To be mentioned |
| (10) | Year of manufacture | : 2024 or later. |
| (11) | Time between top overhaul | : To be mentioned |
| (12) | Time between major overhaul | : To be mentioned |
- (13) **Governor.** Load sharing and speed control precision electronic governor of approved type is to be provided. The Governor should maintain the RPM in steady state and should response instantaneously to any amount of inductive/ resistive load change from (0 to 100%) of rated load.
- (14) **Fuel oil to be used.** Low Sulfur Diesel Oil (LSDO) will be used.
- (15) **Lubricating oil to be used.** As per OEM standard/ equivalent

c. **Specification of Marine Alternators.** Each of the alternators shall be of following specification:

- (1) **Type.** Self-exciting (AREP), self-regulating, revolving field brushless alternator with permanent magnet exciter/ auxiliary regulation excitation system.
- (2) **Standard.** The marine alternators shall conform to IEC/ equivalent recommendations.
- | | | |
|-----|-------|-------------------|
| (a) | Type | : Marine type |
| (b) | Brand | : To be mentioned |



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- (c) Model : To be mentioned
- (d) Country of origin : To be mentioned
- (e) Country of manufacture : To be mentioned
- (f) Year of manufacture : 2024 or later.
- (g) Number of poles : 4 poles.
- (h) Maximum continuous rating (MCR): Sufficient to cater for action load plus 10% reserve.
- (j) Power factor : 0.8 lagging.
- (k) Rated Terminal Voltage : 415V.
- (l) Frequency : 50 Hz.
- (m) No of phases : 3 (three).
- (n) Speed (RPM) : To be mentioned
- (o) Insulation : Class H.
- (p) Enclosure : IP 23.
- (q) **Auto Voltage Regulator (AVR)**. Each alternator shall be incorporated with an electronic type AVR with three phase sensing devices.
- (r) **Alternator Warning and Shutdown Indications.** To ensure safety following warning indications shall be incorporated in each alternator:
 - (i) Overload indication.
 - (ii) Synchronization failure indication.
 - (iii) Over / under voltage indication.
 - (iv) Reverse power indication.
 - (v) Under frequency indication.
- (s) **Local Control Panel.** The local control panel is to be flexibly mounted on the prime mover and shall consist of the following:
 - (i) Panel lights with ON/OFF switch.



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(ii) Over speed protection indication.

(iii) Visual/ audible alarm indication.

(t) **Generator Control Panel.** All necessary gauges/ meters either digital or analogue readout display including kilowatt meter are to be fitted.

(u) **Generator Supply Breaker.** A Generator Supply Breaker as appropriate capacity with following safety devices shall be supplied.

(i) Under voltage release.

(ii) Over Load/ Short circuit release.

0708. **Main Switchboard.**

a. **Type.** 01 (one) in number Main Switchboard is to be located in a suitable position in the engine room. Switchboard should be capable to ensure load distribution of the whole ship in maximum operating condition. The switchboard shall be of marine type, floor mounted. Switchboard and internal components shall be capable of withstanding shipboard vibration without damage or faulty operation.

b. **Dimension.** The dimension of the switchboard is to be such that enough space is made available on the front side of the switchboard for easy maintenance.

c. **Interlocking Arrangement.** Interlocking arrangements with the alternators are to be provided so that shore power cannot be fed to bus bars when any of the alternators is in operation. The switchboard is to be fitted with earthing test facilities.

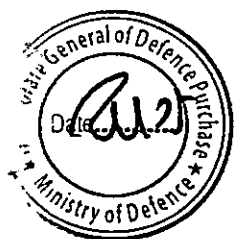
d. **Meters.** All meters (Digital/Analogue readout display) mounted on the front panel of the main switchboard shall be of flush-mounted square marine type with the exception of synchronizing frequency meters, which are to be of the reed type.

e. **Labeling and Color Coding.** Circuit breakers, control switches, instruments, indicating lights and terminal blocks, etc. are to be clearly labeled to identify their purpose and function. Labels for fuses, in addition, are to indicate the rating of the fuses. Feeder nameplate shall indicate the feeder designation, application and rating current. Each feeder breaker on the switchboard shall be distinctly marked with color (Blue, Red, Green, White and Yellow).

0709. **Power Distribution System.**

a. **Configuration.** The power distribution system shall be of radial configuration with floated neutral, three wires, three phase supply onboard the vessel. In general, voltage, frequency and phase shall be as follows:

(1) Generator : 415 V, 50 Hz, 3 Ph.



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- (2) Main Power System : 415 V, 50 Hz, 3 Ph, 3 Wire.
- (3) Lighting system, domestic control system, etc. : 220 V, 50 Hz, 1 Ph.
- (4) Emergency lighting : 24 V DC.
- (5) Pumps, Capstan, Steering system and other Motors: 415 V, 50 Hz, 3 Ph/ 220 V, 50 Hz, 1 Ph.
- (6) Navigation and Communication equipment: 220V, 50 Hz, 1 Ph/ 24 V DC.

b. **Wiring.** The wiring shall be of three wires insulated system for AC three phases circuit and of 2 screened wires insulated system for AC single phase circuit and DC circuit. Standard marine cables are to be used. Interior communication and instrumentation: 220 V, 50 Hz, 1 Ph/ 24 V DC.

0710. **Distribution Panel and Switchbox.** Required numbers of distribution panels are to be fitted and following factors are to be considered:

- a. Non watertight (IP23) and wall mounting type for accommodation spaces.
- b. Totally enclosed (IP 44) and wall mounting type for Engine Room and IP 56 for weather deck spaces.
- c. Distribution panels shall be fitted at suitable positions to supply power to various consumers for lighting, communication etc.
- d. Distribution panels shall have nameplates at the inner side of the front doors representing the name of each circuit.

0711. **Conversion Machinery.** Necessary Transformers, Rectifiers and Converters required for the LCU are to be provided.

0712. **Ship's Along Side Feeder Breaker.** A feeder breaker of appropriate capacity for generator voltage, 3 Phase is to be provided in the shore connection box to supply power to other ships alongside.

0713. **DC Switchboard.** 01 (One) in number DC switchboard is to be provided for charging and discharging of battery and for distributing DC sources to navigation lights, general alarm system, fire monitoring system, internal communication, radio equipment, etc. as emergency supply. In absence of main power supply, emergency DC supply shall be fed to important services by automatic changeover switches of appropriate capacity. Required numbers of changeover switches are to be located either in battery switchboard or at suitable location near the DC switchboard. The switchboard is to be of dead front and self-supporting type. The board is to be fitted with the following instrument and devices:



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- a. DC voltmeter with a selector switch.
- b. DC ammeter for discharging current.
- c. DC ammeter for charging current.
- d. Source pilot lamp.
- e. Changeover switch (quick charging or trickle charging).
- f. Necessary number of miniature circuit breakers and fuses.

0714. **Cables.**

- a. Cables installed throughout the vessel are to be marine type. They are to be of appropriate grade insulation to meet the voltage to which they are subjected.
- b. Shock, vibration, temperature, relative humidity and other conditions of the cables are to be approved type.
- c. All cables including power cables shall have outer shielding.
- d. Insulation of cables throughout the vessel shall be as per the standard of recognized body.
- e. The supplier is to provide sufficient compatible multi standard rubber insulated cables with the Generator sets.

0715. **Motors and Starters.**

- a. **Motors.** Motors is to be of squirrel cage induction type of International Electro-technical Commission (IEC) standard frame designed for AC 415V, 3 Phase, 50 Hz except for the small motors, which may be AC 220V single phase. Motors are to be rated for continuous full load duty except motors for steering gear, deck machinery, etc. However following factors is to be considered:

(1) **Enclosure.** In general, motors are to be of totally enclosed type. However, motors exposed to the weather are to be of totally enclosed water proof type (IP 55).

(2) **Duty/Name Plates.** Motors is to be fitted with duty nameplates engraved in English with manufacturer's name, serial number, rated kW/KVA, RPM, full load and starting current.

(3) **Insulation.** In general, motors are to be treated with insulating varnish to resist oil and water. Generally, motors are to be designed and constructed into insulation class 'H'.



b. **Starters.** Starters for respective equipment/machinery are to be separate and no group starter is acceptable. Starters for non-essential motors of 1 HP and less may be manually operated with MCCBs. In general, starters are to be of direct-on-line starting type for small motors (below 3 kW rated). All motors above 3 kW is to be provided with star-delta starting type starter. Circuit diagrams of starters are to be engraved inside the starter boxes. Following protections is to be provided in motor starters:

- (1) **Under/Over Voltage Feature.** Starters except for non-essential motors of 0.5 kW and less is to be provided with under/over voltage protection or release feature.
- (2) **Over Current Protection.** Over current protection relay of thermal type is to be provided in each starter. The relay is to be of manual reset type with a reset switch operated inside the starter cabinet.

0716. **Lighting.**

a. **General Lighting.**

- (1) The lighting shall be divided into the normal 220 V 50 Hz lighting and the 24 V DC emergency lighting.
- (2) The vessel shall be illuminated with LED lamps as much as possible. Incandescent lamps with guard are to be fitted in machinery spaces as necessary.
- (3) Weather deck and the area around Bridge shall be illuminated with incandescent light and floodlights according to warship standard.
- (4) In general, the type of lighting fixture and fittings shall be as follows depending upon their locations:
 - (a) **Watertight type.** Spaces exposed to the weather, machinery spaces, steering gear room, galley, pantry, deck, stores, etc.
 - (b) **Non-watertight type.** Living quarters, wheel house, equipment spaces etc.
 - (c) **Explosion-proof type.** Battery room, Engine Room etc.
- (5) Lighting fixtures exposed to mechanical damage shall be protected with appropriate guards /globe for LED.



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(6) Domestic power supply arrangements shall be made available at various places on the exposed decks for using portable lights and electrical equipment.

(7) All lighting fixture shall be of marine standard.

(8) Illumination lights (with circuit) are to be provided for rigging from ship's mast to forepeak and to ensign staff at after deck.

(9) Decorative lighting circuit with lights is to be provided for the gangway brow, bridge and other areas as necessary.

(10) Necklace and Rainbow circuit lights is to be provided with water proof holders along with white color LED lights.

b. **Interior Lights.**

(1) The interior lighting shall be designed for operation on 220 V 50 Hz. The interior of the vessel shall be adequately lighted with marine type LED lights.

(2) Details of the interior lighting, socket outlets, etc. in the engine room, steering gear room, cabins, corridors, stores, toilet/shower, mess/galley, Bridge, ops room, etc. are to be specified.

(3) Communication room, chart table, ops room and cabin space lights shall have dimmer facility.

c. **Exterior Lighting.** All exterior lights, socket outlets etc. in the aft and fore deck and on top of the Bridge shall be of warship standard.

d. **Emergency Lighting - Automatic Emergency Lanterns.** Sufficient numbers of automatic emergency lanterns are to be provided in every compartment, passage and internal areas to show passage out to the weather deck in case of power failure. They shall be wired in conjunction with normal lighting supply system for automatic charging with the normal ship's supply and shall automatically switch on when normal supply fails.

e. **Navigation Lights.**

(1) Electric navigation lights are to be provided as per the international maritime regulation and warship standard. The navigation lighting is to be of 24V DC with battery backup source.

(2) A control panel for navigation lighting fitted with navigation light 'ON' indications, visual and audible alarms, etc. is to be installed in the Bridge.

(3) The navigation lights are to be as per IMO/warship standard.



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(4) All lights to be fitted on board as per relevant international rules for preventing collision at Sea.

f. **Signal Lights.** Electric signal lights are to be as per international maritime regulation and warship standard and are to be fitted at appropriate location in the vessel as per warship standard.

0717. **Navigation Auxiliary Equipment.**

a. **Window Wipers.** 01 (one) in number of electrically operated window wiper is to be fitted on the front windows in the Bridge.

b. **Clear View Screen.** 02 (two) in number clear view screen is to be fitted on port and starboard sides of the front window.

0718. **Domestic Fans.** Sufficient numbers of oscillating domestic fans are to be fitted in the bridge, accommodation spaces and other spaces as required.

0719. **Power Receptacles.** Following compartments is to be provided with power receptacles:

Ser	Compartments	Power
1.	a. All equipment compartment, bridge, Ops room, machinery space, etc.	220V 50Hz 1Ph and 24 V DC
2.	b. All accommodation and recreation space, wardroom, equipment compartment, Bridge, galley etc.	400 V 50Hz 3Ph and 220V 50Hz1Ph
3.	c. At least 04 locations on the main deck for Submersible pump.	400V, 50Hz 3Ph

0720. **Miscellaneous Electrical Equipment.**

a. **PA System.** 01 (one) set Public Address (PA) system with necessary accessories & power control cable shall be provided which shall consist at least the following items:

- (1) 01 x Power Amplifier
- (2) 03 x Microphone
- (3) 03 x Loud Speaker.

b. 02 (Two) x Loud Hailer

c. **Intercom System.** 01 (one) set standard Internal Telephone System (Intercom) covering bridge, office, Engine room and accommodation area (CO's cabin, officers' cabin, Dining room & common area) will be provided.



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- d. **CCTV System**. 01 (one) set CCTV system consist 01 (one) camera at foxc'l, 01 (one) camera at main deck accommodation entry and 01 (one) in Bridge Night Vision high-resolution capability is to be provided. CCTV surveillance with at least 15 days of video storage facility
- e. 02 (two) x electric irons.
- f. 02 (two) x iron board/ stand.
- g. Any other electrical items considered essential for the vessel.



PART-8**NAVIGATIONAL EQUIPMENT/AIDS**

0801. **Navigation Aids.** The Navigation equipment/aids will be required for ship's movement, position and navigational plot. The LCU is to be provided with the following navigation equipment/aids:

- a. 01 (one) x Navigation Radar
- b. 01 (one) x Gyro Compass
- c. 01 (one) x Magnetic Compass
- d. 01(one) x GPS
- e. 01 (one) x Echo Sounder
- f. 01 (one) x Digital Anemometer.
- g. 02(two) x HD Binoculars

0802. **Navigational Radar.** 01 (one) in number Navigation of following specifications to be installed in Bridge for the LCU.

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Antenna Type : Random.
- d. Display Size : Min 8" LCD/LED.
- e. Range :Min 32 nm.
- f. Country of origin : To be mentioned.
- g. Country of manufacture : To be mentioned
- h. Year of manufacture : 2024 or later.

0803. **Gyro Compass.** 01 (one) in number Gyro Compass of following specification is to be installed in Bridge for the LCU.

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Setting Time : Approximately 3 (three) hours.



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- d. No of repeaters : One-unit repeater station.
- e. Country of origin : To be mentioned.
- f. Country of manufacture : To be mentioned
- g. Year of manufacture : 2024 or later.

0804. **Magnetic Compass**. 01 (one) in number Compass of following specification is to be installed in Bridge for the LCU.

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Size : Min 4".
- d. Country of origin : To be mentioned.
- e. Country of manufacture : To be mentioned.
- f. Year of manufacture : 2024 or later.

0805. **GPS**. 01 (one) in number Global Positioning System (GPS) of an internationally reputed company are to be installed for continuous position. The specification of the GPS shall be as follows:

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Display Size : 4.2" Color LCD/LED.
- d. Country of origin : To be mentioned.
- e. Country of manufacture : To be mentioned.
- f. Year of manufacture : 2024 or later.

0806. **Echo sounder**. 01 (one) in number Echo sounder of following specification is to be installed in Bridge for the LCU.

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Water depth range : 0.5 – 50 m
- d. Display Size : Min 5" Color LCD/LED.



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- e. Country of origin : To be mentioned.
- f. Country of manufacture : To be mentioned
- g. Year of manufacture : 2024 or later.

0807. **Digital Anemometer.** 01 (one) in number Digital Anemometer following specification is to be installed in Bridge for the LCU.

- a. Brand : To be mentioned.
- b. Model : To be mentioned.
- c. Wind Speed Range : up to 100km/hr
- d. Wind Direction Range : 0⁰-359⁰.
- e. Country of origin : To be mentioned.
- f. Country of manufacture : To be mentioned
- g. Year of manufacture : 2024 or later.

0808. **Navigation lights.** 01 (one) set of Navigation lights shall be provided as per standard COLREG 1972.



PART-9

COMMUNICATION EQUIPMENT

0901. **Radio Communication.** External communication systems (Non-integrated) for ship-ship, ship-shore and aircraft communication will be enabled by the following:

- a. 01(One) x HF Transceiver (To be provided by BN).
- b. 01(One) x Marine VHF Transceiver.
- c. 01 (One) x VHF Air band Transceiver (To be provided by BN).
- d. 06 (Six) x Marine VHF Walkie Talkie
- e. 01 (one) x Air Band Walkie Talkie (To be provided by BN).

. 0902. **Visual Signaling Equipment.**

a. **Signal projector/ Search light.**

- (1) Quantity : 03 (Three) (One near bridge and two near fox'l)
- (2) Power : 500 W.
- (3) Protection level : IP 56.

- b. Visual Signaling Stowage Arrangements (01x Flag Locker & 01x VS Store).
- c. Visual signaling arrangement (08 x Black Ball & 02 x Black Diamond)
- d. 01 x Complete sets of dressing line and two complete set of flags including anchor flag, pennants, ensigns and distinguishing flags.



PART-10**SPARE PARTS, TOOLS, TEST EQUIPMENT AND ACCESSORIES**

1001. **Spare Parts.** The following mandatory spares shall be provided from OEM/ OEM authorized dealer with the vessel during delivery.

a. **Main Engine.**

(1)	Injector	: 06 in no.
(2)	Cylinder head gasket	: 12 in no.
(3)	Push rod	: 06 in no.
(4)	Rocker arm spring	: 06 in no.
(5)	Inlet valve	: 06 in no.
(6)	Exhaust valve	: 06 in no.
(7)	Valve guide	: 06 in no.
(8)	Compression ring	: 06 in no.
(9)	Oil ring	: 06 in no.
(10)	Fuel filter	: 06 in no.
(11)	Lub oil filter	: 06 in no.
(12)	Air filter	: 08 in no.
(13)	Impeller FW pump	: 02 in no.
(14)	Mechanical seal FW pump	: 02 in no.
(15)	Shaft for FW pump	: 01 in no.

b. **Gear box.**

(1)	Filter element	: 04 in no.
(2)	O-ring	: 06 in no.
(3)	Seals	: 06 in no.

c. **Prime Mover for Generator.**

(1)	Injector	: 06 in no.
(2)	Cylinder head gasket	: 06 in no.
(3)	Push rod	: 04 in no.
(4)	Rocker arm spring	: 04 in no.
(5)	Inlet valve	: 06 in no.
(6)	Exhaust valve	: 06 in no.
(7)	Valve guide	: 06 in no.
(8)	Compression ring	: 06 in no.
(9)	Oil ring	: 06 in no.
(10)	Fuel filter	: 06 in no.
(11)	Lub oil filter	: 06 in no.
(12)	Air filter	: 06 in no.
(13)	Impeller FW pump	: 01 in no.



RESTRICTED

- (14) Mechanical seal FW pump : 01 in no.
- (15) Shaft for FW pump : 01 in no.

1002. **Tools and Test equipment.** The following general-purpose tools and test equipment shall be supplied with the vessel during delivery

a. **General Purpose Tools.**

- (1) 01 x Propeller nut spanner.
- (2) 01 x Set of Propeller pulling device.
- (3) 01 x Grease guns with nipples.
- (4) 01 x Tool boxes with standard tools.
- (5) 01 x set of Socket spanners (6-30mm).
- (6) 01 x set of Ring spanners (6-30mm).
- (7) 01 x set of Open-end spanners (6-30mm).
- (8) 01 x set of Adjustable spanners (6", 8", 10").
- (9) 01 x set of Allen keys (2-12mm).
- (10) 01 x set of Files (Flat, Square, Triangle).
- (11) 01 x Carpentry tool boxes with standard tools.
- (12) 02 x Bearing extractors (Standard size).
- (13) 02 x Chain blocks (2-ton capacity).

b. **Test Equipment.**

- (1). 01x Digital Multimeter.
- (2). 01 x Weber Tester.
- (3). 01 x Megger.



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PART-11

ACCOMMODATION, STORES AND AMENITIES

1101. **General Arrangement.** The LCU is to be arranged with the following accommodation, living and working spaces, tanks and stores:

a. **Accommodation.**

- (1) 01 x cabin for 03 (three) officers.
- (2) 02 x double berth cabins for 08 (eight) senior rating crews.
- (3) 02 x double berth cabins with 12 (twelve) junior rating crews.

b. **Utility Compartments.**

- (1) Common galley for all.
- (2) Common sanitary space for all.
- (3) Common Dining with recreation facilities for other ratings.

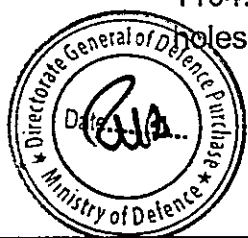
c. **Storage Capacity.**

- (1) Diesel and lubricants storage facility for stated endurance.
- (2) 01 x Fresh and Dry Provision store.
- (3) 01 x Naval Store/ locker.
- (4) Rope and Rigging store (in bos'n store).
- (5) Paint Store and Chain Locker
- (6) 01 x DCFF Locker.

1102. **Tanks.** Tanks for fuel oil, lub oil, fresh water, dirty lub oil, foam, etc. are to be provided as necessary. Most of the tanks are to be constructed as integral part of the hull. The tanks are to be fitted with filling and discharge lines and valves, gauges, vents, etc. The fuel oil capacity should be such that LCU can run at least the desired endurance at cruising/economical speed.

1103. **Stores.** Store capacity is to be commensurate with the requirements of complement and endurance. The stores are to be fitted with shelves, racks, bins and other facilities as required. Adequate on board fast moving & ready use spares' storing capacity is to be available.

1104. **Flag Lockers.** 01 (one) in number flag lockers of suitable size with 70 pigeon holes to be fabricated and fitted on the upper deck near to the mast.



RESTRICTED

1105. **Furniture, Fixtures and Facilities.** Adequate numbers of standard furniture, fixtures and facilities of good marine quality for accommodation, living spaces and working places is to be provided.

1106. **Furniture Application for Living Spaces, Gangway, Lobby and Bridge**

Location	Persons	Particulars
Officer's Cabin	03	One cabin with three beds (1x single bed and 1x two tier bed) including desk with of drawers, arm-chairs, locker, hat and coat hook, clock, waste basket, etc.
Senior Rating's Room	08	Two cabins with four beds, (2x two tier bed) with locker, mirror, clock, waste basket etc.
Junior Rating's Room	12	Two cabins with six beds, (3x two tier bed) with lockers, clock, waste basket, etc.
Bridge	-	01 x bridge console with chair, 01 x CO's chairs with arms, 01 x bridge clock, 01 x book rack, wooden rack, first aid box, etc.

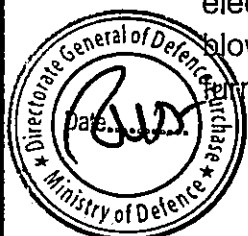
1107. **Furniture for Exposed Deck and Other Spaces.** Following furniture is to be provided on exposed deck:

- a. 02 x Aluminum life jacket boxes.
- b. 02 x First aid boxes.
- c. 03 x Standard chairs.

1108. **Fittings/Fixtures of Sanitary Spaces.** All exposed metal fixtures, taps, valves, accessories, etc. is to be of chromium coated brass. Rubber washers are to be fitted between plumbing fixtures and metal supports. Specifications of the fixtures is to be as follows:

- a. **Wash Basin.** Stainless steel /Ceramic wash basins are to be fitted with water supply.
- b. **Water Closet.** Material of the closets is to be hard plastic seat and lid. Flush commode, shower spray and one freshwater tap are to be provided.
- c. **Others.** Wall mounted lavatory rack and mirror with the washbasins; soap holder, towel rack, hooks, toilet paper holder, seawater tap, washing machine, clarifier etc. is to be provided as necessary.

1109. **Galley.** The galley shall have facility to cook food for 32 persons including electric cooking range, bread toaster and microwave oven. Adequate supply and exhaust blowers are to be fitted to facilitate good ventilation. Following fixtures, equipment and furniture is to be provided:



RESTRICTED

- a. 01 x Electric cooking range (with integral oven) having 4 hot plates.
- b. 02 x Rice cooker (About 8 kg capacity).
- c. 01 x Stainless steel sinks (2 x bowls).
- d. 01 x Stainless steel working table.
- e. 01 x Exhaust fan.
- f. Freshwater and Seawater taps.
- g. 01 x Refrigerator.
- h. 01 x Deep Fridge (220 Litre or more).
- j. 01 x Microwave oven.
- k. 01 x Blender/ mixer.

1110. **Dining/ Mess Room.** Following facilities is to be provided for the dining/ recreation enclosure:

- a. Dining table with chair.
- b. 01 x Bread Toaster.
- c. 01 x Electric Kettle.
- d. 01 x Stainless steel sinks.
- e. 01 x Smart LED TV (32" or more).

1111. **Mess Traps, Mess Utensils and Galley Implements.** Mess Traps, mess utensils and galley implements are to be supplied for Wardroom and ship's galley as per ship's complements.

1112. **Office Equipment.** The Office is to be equipped with the following:

- a. Cabinets and shelves for correspondence files and publications.
- b. 01 x Computer with keyboard & mouse, 01 x printer, 01 x UPS, 01 x 1TB portable HDD and 01 x pen drive.
- c. 01 x desk with desk light, 01 x chairs with arms, etc.

1113. **Laundry Space.** 1 x Washing machines (10 kg capacity) to be provided.



PART-12**INSPECTION AND TEST / TRIAL**

1201. **General**. Prior to keel laying, the General Arrangement (GA) drawing has to be approved by BN. During construction of each work, inspection is to be done jointly by BN and builder. Test and trials of individual equipment and machinery at various level i.e. STW (Setting to Work/Installation), HAT, SAT/River trial etc. as applicable are to be done jointly by the BN representative and the builder. Shipbuilder shall submit test protocol to BN 4(four) weeks prior to conduct Test/ Trial. Before conducting trial, BN will approve test protocol as per standard procedure. All test/ trial shall be complied at Normal standard loading condition.

1202. **Standard load condition**. The standard load condition for the vessel would mean the summation of Light weight displacement of the vessel, total crew on board and 50% of Fresh water, POL and deck load as stated in subsequent clauses.

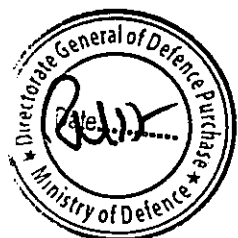
1203. **Inclining Experiment**. The inclining experiment is to be carried out upon the substantial completion of LCU but before the sea trial and results are to be recorded for the calculation of the vessel's trim, stability, light weight and dead weight.

1204. **Test and Trial**.

a. **Harbour Acceptance Trial (HAT)**. Performance test of all machinery and equipment are to be carried out with BN personnel on board. During on board test, all machinery, equipment and all piping and wiring systems supplied and / or installed on board will be tested as far as practicable and should meet its applicable requirement. The harbor trial of the on board machineries are to be carried out prior to sea trial and the test should meet its applicable requirement.

b. **Sea Acceptance Trial (SAT)/River Trial**. Sea Acceptance Trial/ River trial of the ship will be conducted by the shipbuilder in presence of BN acceptance team and manufacturers of concerned major equipment on board. Sea trial/ River trial will be carried out to verify the correct operation of the systems and machinery during underway and to check that the test performance is in compliance with the LCU specification. The trial will include:

- (1) **Maximum Speed Trial**. Maximum speed trial will be carried out for 30 (thirty) minute duration. Maximum speed will be determined by running the ship for 15 minutes at a stretch with the tide and 15 minutes against the tide at a stretch and arithmetic mean speed of the two runs. Both the run should be conducted without any interruption.
- (2) Endurance test at economic speed (1hour).
- (3) Testing of all sensors for determining their sensitivity and maximum range and coverage.



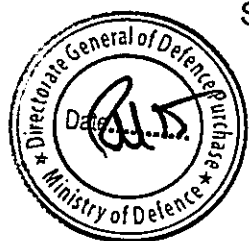
PART- 13**PRICE AND PAYMENT SCHEDULE**

1301. **Total Contract Price.** The price is to be quoted in Bangladeshi Taka and broken down into the following components, from where BN shall have the option to choose the whole or part of any component:

Ser	Description	Price in BDT
1.	Price of design package including all design, drawings, etc	To be quoted
2.	Price of construction material package	To be quoted
3.	Price of propulsion machinery, control systems, gearboxes, shafting and propellers	Price of each item to be quoted separately
4.	Price of electrical power generation and distribution system	To be quoted
5.	Price of all auxiliary machinery and equipment	To be quoted
6.	Price of all deck machinery	To be quoted
7.	Price of electrical and electronic equipment (including navigational and communication equipment, etc.)	To be quoted
8.	Cost of construction including labour charges, services of machinery installation experts, etc related to construction	To be quoted
9.	Price of mandatory spare parts, special tools and test equipment	To be quoted
10.	Cost of Project Implementation Team (PIT) in accordance with Article 0109	To be quoted
11.	Cost HAT and SAT	To be quoted
12.	Cost of shipment of the LCU from yard to South Sudan	To be quoted
13.	Any Other charges	To be quoted
	Total =	To be quoted

1302. **Payment terms.** All payment shall be made in local currency (Bangladeshi Taka). Payment schedule will be under following terms and conditions:

- First Installment.** 20% of TCP will be paid on approval of General Arrangement (GA) drawing by BN, submission of Keel laying certificate duly endorsed by BN representative, submission of PG and hull material stock list.
- Second Installment.** 30% of the TCP will be paid on completion of nesting, cutting and sub-assembly of main hull and receiving purchase orders of major machineries (Main Engine, Gear box, Generator set, Shafting and Steering System) and endorsed by BN representative.



c. **Third Installment.** 20% of the TCP will be paid on shipment of vessel's hull blocks with all equipment from Bangladesh to South Sudan.

d. **Fourth Installment.** 30% of the TCP will be paid after completion of test/ trial, final acceptance of LCU by BN Acceptance team. The PG will be released upon received of Acceptance Certificate issued by BN and 5% of TCP as Guarantee of Warranty

1303. **Price Readjustment.** BN will not consider readjustment of the total contract price due to escalation of price of machinery, equipment or materials over the period of construction of the vessel and also due to fluctuation of foreign currency exchange rates over the period of construction of the vessel.

1304. **Duration of Project and Delivery.** The vessel shall be delivered to Juba at South Sudan or as per directive of NHQ with 06 (Six) months time from the date of signing the contract with BN. The builder will give the owner 04 (four) week's notice for taking the delivery of the vessel after completion of construction and launching.

1305. **Shipment.** On completion of construction of the vessel, the builder will arrange its responsibility and cost for transportation of the vessel from yard/ building site to South Sudan.

1306. **Mandatory Provisions to be Incorporated in the Contract.** The following are intended to be entered as an integral and mandatory part of the Contract to be signed following a successful offer.

a. **Penalty for Insufficient Speed.**

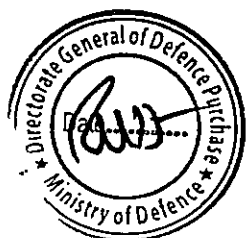
(1) The bidder shall have to guarantee that the supplied propulsion machinery shall enable the Vessel to achieve the desired maximum speed (as per contract).

(2) In case The Landing Craft Utility (LCU) fail to achieve the maximum speed as stated in Article 0207a, penalties is to be imposed on the builder for non compliance of the contract as mentioned in the following table:

Ser	Speed Deficiency	Penalty counted in % of TPC
1.	1.00 to 1.25 knots	0.5%
2.	1.26 to 1.50 knots	1%
3.	1.51 to 1.75 knots	1.5%
4.	1.76 to 2.00 knots	2%
5.	More than 2.00 knots	BN may cancel the contract

b. **Warranty Period/Services.**

(1) The Shipbuilder shall undertake the full responsibility to rectify, any defect in of the Vessel which is due to defective material, construction, miscalculation and/ or improper workmanship on part of the bidder and/ or its subcontractors, or to replace any such defective item, equipment and



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machinery, provided that the defects are revealed/ discovered during the period of 12 (twelve) months after delivery of the Vessel at builders expense.

(2) Warranty repair/ replacement shall be accomplished in South Sudan.

