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Project-694/ 04 01 January 2026

INVITATION FOR EXPRESSION OF INTEREST (EOI)

Reference:

A. Invitation for DGDP Tender Number 241.07.178.2025.

1. **Preamble**. Four Large Patrol Crafts (LPC) (two of Anti-Submarine Warfare (ASW) capability and two of Anti-Surface Warfare (ASuW) capability) will be constructed for Bangladesh Navy (BN) in Khulna Shipyard Ltd (KSY) at Khulna, Bangladesh. The basic design of the LPCs should be based on a proven hull design. KSY will collaborate with the foreign shipbuilder or their authorized principal. Here, BN is the Purchaser and KSY will act as the Supplier/ Shipbuilder in the DGDP tender. These LPCs should be certified by the International Association of Classification Society (BV/ LR) regarding their design and construction. The roles of the LPCs are as follows:

a. **ASW LPC**. The primary role of the ASW LPC will be to conduct ASW operations with limited surface and self-defense capabilities. The ship should be able to detect, identify, track, engage, and attack hostile submarines. The secondary role of the proposed LPC will be to conduct coastal patrols and perform constabulary duties within the EEZ.

b. **ASuW LPC**. The primary role of the ASuW LPC will be to conduct ASuW operations with self-defense capability. The ship should be able to detect, identify, and destroy surface targets. The secondary role of the proposed LPC will be to conduct coastal patrols and perform constabulary duties within the EEZ.

2. Khulna Shipyard Ltd (KSY) invites Expression of Interest (EOI) from reputed foreign shipbuilder/ supplier to submit offer for delivery of design and material package for 04 (Four) in number LPC (2 x ASW LPC and 2 x ASuW LPC) as per Reference A. Brief description of the project is as follows:

a. **Project Description**. Construction of 04 (Four) in number Large Patrol Craft (LPC).

b. **Quantity**. 04 (Four) in number Large Patrol Craft (LPC).

c. **Place of Construction**. Khulna Shipyard Limited.

d. **Project Duration**. 4 X LPCs will be delivered within 48 months of the contract effective date.

e. **Design**. The design of the offered LPCs must be based on a proven hull design, which shall mean the following:

(1) Ships with a similar proven hull design are already in service with any Navy/Coast Guard.

(2) The offered ships may differ from the ships in service in General Arrangement (GA), type/model of machinery, equipment, systems, or armament to meet the tender requirements, provided that the basic hull design (including principal particulars and hydrostatic particulars), displacement, and stability characteristics must remain essentially unchanged and acceptable to the buyer. However, the ship's design should be modern and well-configured.

(3) The foreign shipbuilder/ supplier is to provide with the quotation a certificate of authority in original from the designer stating that the offer is based on a proven hull design. This certificate must also contain the name(s) of vessel(s) built as per the said proven hull design.

(4) The offered LPC should be in use, preferably in at least one country, for at least the last 2 years. Related proof documents will be provided with the offer.

f. **Certificate for Proven Design.** A certificate from the designer, in the original, stating that the design is based on a proven hull design and authorizing the selected Supplier to use the design, along with modifications as required for the LPCs in Bangladesh, needs to be provided.

g. **Classification.** The LPCs should be of warship design and standard. The classification/ standard of hull, structure, machinery, equipment, and fittings of the LPCs should be of the classification/ standard of a naval warship. The LPCs must be built in accordance with the warship-building standards of an internationally recognized classification society. The classification society referred here must possess the following criteria:

(1) Classification Society for the construction of the LPCs must be BV/ LR (Member of IACS).

(2) Classification society having recent records of supervising the design and construction of warships/ marine vessels.

h. **Country of Origin and Manufacturer of all Equipment, Machinery, Shafting, Weapon, Sensors, Power Generation, Distribution etc.** As stated in the respective item's description in the attached technical specification.

3. **Basic Technical Specification of 4 x LPCs.**

a. Length OA : Not less than 64 m (to be mentioned).

b. Breadth : Not less than 9 m (to be mentioned).

c. **Draft.** Not more than 4m (at full load with any underwater projection) (to be mentioned).

a. Base line of the vessel shall be taken along the molded line of the keel, which shall represent the reference plane for all vertical measurements, including the draft (to be mentioned).

b. In case of the sonar dome projection below baseline (for ASW LPCs), the projection shall be explicitly mentioned and added to the draft.

c. In case of any other projection below baseline, the projection shall be explicitly mentioned and added to the draft.

d. The final draft of the vessel shall be taken as the sum of the molded draft measured from the baseline (keel line) plus the maximum projection of any appendage or fitting located below the baseline. The total draft, inclusive of such projections, shall in no case exceed 4 m at full load displacement.

d. **Speed.**

(1) **Maximum Speed.** Not less than 24 Knots.

(2) **Maximum Continuous Speed.** To be mentioned.

(3) **Economic Speed.** To be mentioned.

e. **Endurance.** Not less than 2500 NM at economic speed.

f. **Displacement at Full Load.** 720 tons (± 5%) tons (to be mentioned).

g. **Complement.** The ship should accommodate at least 75 personnel (including at least 9 officers).

4. **Technical Specification**. The foreign shipbuilder/ supplier has to submit the offer fulfilling all the tender requirements as per attached technical specification and 'List of Content' enclosed as '**Enclosure-1**'. List of content is a guideline for the foreign shipbuilder/ supplier which indicates the documents that must be submitted with the offer.

5. **Article-wise Compliance Sheet**. Article-wise compliance with the Technical Specification of LPC is to be provided. The foreign shipbuilder/ supplier should clearly state whether they comply with the purchaser's requirements and offers as set out in the various articles of the tender specification. For any deviation from that, it is to be clearly mentioned in the offer. A blank format is given as Annex-F of attached tender specification.

6. **Qualification Criteria of the Foreign Shipbuilder/ Supplier.** The foreign shipbuilder/ supplier must fulfill the requirement mentioned at serial 2(e) above.

7. **Submission of Quotation**. The quotation must include the following:

a. Complete technical specification (make, model, type, and detailed technical particulars of machinery and equipment) of the LPCs.

b. Preliminary General Arrangement (GA) and Mid-ship Section Drawing of the proven LPC as well as offered LPCs.

c. List of LPC(s) built so far from the same proven hull design (based on the offered LPCs for BN) with names of owners and their present contact address.

d. Delivery Certificate of the proven LPC or LPC built on the same proven hull.

e. Tentative delivery schedule (with reference to the date of signing the contract) of the construction drawing & material, major machinery/ equipment, weapons, sensors, and other items for the construction of 4 in number LPCs.

f. Production schedule for construction (preeminent events related to the payment terms mentioned in this tender specification).

g. A set of design calculations and drawings, which may include the following:

(1) Preliminary tanks (POL, Fresh water, ballast, etc.) layout Plan with capacity.

(2) Preliminary Trim and Stability Booklet.

(3) Preliminary Damaged Stability Calculations.

(4) Preliminary Endurance and Sustainability Calculations.

(5) Preliminary Layout of armaments (with firing arc) and Magazines.

(6) Preliminary Arrangement of Accommodations.

(7) Preliminary Arrangement of Machinery-plan View.

(8) Preliminary Arrangement of Main Shafting.

(9) Preliminary Ventilation and Air Conditioning Diagram.

(10) Preliminary Arrangement of Electrical/Electronic Equipment.

(11) Preliminary Electrical Load Analysis.

(12) Noise and Vibration Analysis.

h. In case of an offer from an authorized foreign Principal/ Agent, the bidder will provide the offer Authorization Certificate (original) from their Principal/ Agent.

i. Original certificates of providing after-sales warranty, supply of spares, and other services for the complete package of supply.

8. **Bid Price and Terms of Payment.**

a. **Bid Price.** The quoted price (in USD) is to be broken down into the following components as per Annex A to C of attached tender specification, from where BN (BN) will have the option to choose the whole or part of any component:

(1) Price of design package including all design, drawings, etc.

(2) Price of the construction material package.

(3) Price of propulsion machinery, its control systems, gearboxes, shafting, and propellers.

(4) Price of the electrical power generation and distribution system including all conversion machineries.

(5) Price of all auxiliary machinery and equipment.

(6) Price of all deck machinery.

(7) Price of electrical and electronic equipment (including navigational communication equipment, sensors, etc.)

(8) Price of ASW and ASuW Weaponry System and Armaments.

(9) Price of mandatory spare parts in accordance with Article 1201 of technical specification.

(10) Price list of spare parts for 5 (five) years for smooth operation.

(11) Price of general tools, special tools, and test equipment.

(12) Cost of Orientation Training on operation and maintenance of machinery, equipment, and systems in accordance with Article 1208 of technical specification.

(13) Cost of services of shipbuilding experts, machinery installation experts, etc. related to construction.

(14) Cost of services related to construction.

b. **Payment Terms and Schedule.** 2 X ASW LPCs and 2 X ASuW LPCs (a total of 4 in LPCs) will be constructed within the prescribed period of time. Payment for each category of LPCs shall be made through bills/documents submitted by the Foreign Shipbuilder/ Supplier. All payments shall be made in foreign currency (USD). Payment schedule for each category of LPCs (2 X ASW LPCs and 2 X ASuW LPCs) will be under the following terms and conditions:

(1) 20% of the Total Contract Price (TCP) of Four LPCs is to be paid on signing of the contract and submission of the provisional GA drawing, and submission of a Bank Guarantee equivalent to 20% of the TCP.

(2) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on keel laying of 2 X ASW LPCs and submission of keel laying certificate endorsed by BN.

(3) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on keel laying of 2 X ASuW LPCs and submission of keel laying certificate endorsed by BN.

(4) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on submission of Commercial Invoice (CI) copies for the procurement of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASW LPCs and endorsed by BN.

(5) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on submission of Commercial Invoice (CI) copies for the procurement of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASuW LPCs and endorsed by BN.

(6) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on completion of construction up to deck level of 2 X ASW LPCs and on arrival of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASW LPCs and a certificate endorsed by BN.

(7) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on completion of construction up to deck level of 2 X ASuW LPCs and on arrival of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASuW LPCs and a certificate endorsed by BN.

(8) 5% (2.5% for each ASW LPC) of the Total Contract Price (TCP) will be paid upon launching of 2 X ASW LPCs and submission of the launching certificate endorsed by BN.

(9) 5% (2.5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid upon launching of 2 X ASuW LPCs and submission of the launching certificate endorsed by BN.

(10) 5% (2.5% for each ASW LPC) of the Total Contract Price (TCP) will be paid upon satisfactory Test, Trial, and Final Acceptance of 2 X ASW LPCs by the Acceptance team of BN.

(11) 5% (2.5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid upon satisfactory Test, Trial, and Final Acceptance of 2 X ASuW LPCs by the Acceptance team of BN.

(12) Payment shall be made after receiving from BN as per above mentioned payment schedule and will be released as per the final agreement.

9. **Scope of Supply of Foreign Shipbuilder/ Supplier.** Scope of supply of Foreign Shipbuilder/ supplier will be as follows:

a. Foreign shipbuilder/ supplier will submit appropriate offer as per technical specification.

b. Foreign shipbuilder/ supplier must supply the design package and all copies of construction drawings (including machinery/ equipment/ items installation drawings) for the LPCs to be built. All drawings must be provided on drawing paper that will last as long as the ship's shelf life. A Full set of final drawings (as constructed) needs to be provided after a satisfactory test trial of the LPCs.

c. Foreign shipbuilder/ supplier will supply all required items, like design and drawing, including construction drawing, construction materials, propulsion, auxiliary machinery and sensors, weapons, navigational aids, communication equipment, power generation and distribution plants, deck machinery, air conditioning and ventilation system, electrical and electronic equipment, galley equipment, stores, tools etc. The foreign shipbuilder/ supplier will also supply other items where necessary as per technical specification mentioned in the tender document. BN will supply small arms and diving sets.

d. Foreign shipbuilder/ supplier will assist/ supervise to construct the hull and structure of the LPCs. KSY will construct the hull and structure accordingly.

e. Foreign shipbuilder/ concerned suppliers will assist/ supervise to install all machinery, equipment, sensors (including all communication & navigation equipment such as RADAR, Gyro compass, Eco sounder, etc.) and fittings as necessary. KSY will install the same accordingly.

f. Foreign shipbuilder/ concerned suppliers will assist/ supervise to install the Guns and Fire Control system. KSY will install the same accordingly. Necessary drawings, instructions, special tools/instruments, and guidelines are to be provided by the foreign shipbuilder/ concerned suppliers. The foreign shipbuilder/ concerned suppliers will hand it over to BN.

g. Foreign shipbuilder/ concerned suppliers will assist/ supervise to install Torpedo, ASW weapons, SONAR, and ASW Combat Management System (CMS) for ASW Ship. KSY will install the same accordingly. The foreign shipbuilder/ concerned suppliers will provide the necessary drawings, instructions, special tools/ instruments, and guidelines. The foreign shipbuilder/ concerned suppliers will hand it over to BN.

h. Foreign shipbuilder/ concerned suppliers will assist/ supervise to install Missile system with launchers, sensors, and Combat Management system (CMS) for ASuW Ship. KSY will install the same accordingly. The foreign shipbuilder/ concerned suppliers will provide the necessary drawings, instructions, special tools/ instruments, and guidelines. The foreign shipbuilder/ concerned suppliers will hand it over to BN.

i. Foreign shipbuilder or their authorized Principal/ Agent will conduct test, trial, and commissioning of all machinery, equipment, fittings, sensors, weapons, and systems as necessary. KSY will provide full support and co-operation test, trial and commissioning in this regard.

j. Foreign shipbuilder/ supplier will provide the following items (to be specified in the offer and subject to approval of BN):

(1) RAS gear, Towing gear, DCFF equipment (as per Annex G and Annex K of technical specification).

(2) Security equipment (locks and key arrangements).

(3) Furniture (portable only) and lavatory fittings.

(4) Entertainment equipment (like TV, DVD, etc.).

(5) Mess traps, mess utensils and galley implements (as per Annex J of technical specification).

(6) POL items including cooling water inhibitor/ coolant, grease, refrigerant, and chemicals required for first filling and or test & trials and or till handing over to BN along with specification (subject to approval of OEM/ foreign shipbuilder).

(7) Any other items small in nature like flags/ buntings, ship's bell, data plaque, safety chains, curtains, sofa covers, bedding items, ship's husbandry items, etc.

(8) Minor items required for the regular operation of a warship; however, the allocated cost of these items should be mentioned by the foreign shipbuilder/ supplier. BN will have complete freedom to choose the items.

k. Foreign shipbuilder/ supplier will deliver the LPCs to BN as per the contract.

l. The test and trial completion certificate is to be signed jointly by the Foreign shipbuilder/ supplier, KSY and BN.

m. Foreign shipbuilder/ supplier will submit a preliminary Computational Fluid Dynamics (CFD) analysis during bidding the tender and a complete CFD analysis need to be provided during the signing of the contract.

n. Foreign shipbuilder/ supplier will provide the after-sales warranty, supply of spares, and other services for the complete package of supply to BN.

o. Training will be provided by Foreign Engineer (cost should be included in the offer).

p. Factory Acceptance Test (FAT) will be conducted as per technical specification and cost should be included in the offer.

q. Harbour Acceptance Trial (HAT) and Sea Acceptance Trial (SAT) will be conducted as per technical specification and cost should be included in the offer.

r. Foreign shipbuilder/ supplier will bear the cost of classification fees (Construction Supervision and Design Approval).

s. Foreign shipbuilder/ supplier will furnish Performance Guarantee (PG) (5% of the contract price), Bank Guarantee (20% of the contract price) as per payment terms, Bank Guarantee for Warranty (5% of the contract price), etc. through scheduled Bank of Bangladesh to KSY as per contract between KSY and Foreign shipbuilder/ supplier if awarded.

t. Financial offer has to be submitted in Foreign Currency (USD). The offer should be firm and fixed.

u. During implementation of the project, if any Liquidated Damage (LD) is imposed on KSY (due to delay arrival or short supply of material and delay in construction by the foreign shipbuilder/ supplier), the same will be imposed on the foreign shipbuilder/ supplier.

v. Charges related to Fooding, Medical Support, Air Fare, Transportation etc. of OEM Engineers/ Foreign Experts/ Foreign Partner will be borne by the foreign shipbuilder/ supplier.

w. The amount of speed penalty imposed on KSY from BN due to less speed as mentioned in the technical specification, the same will be imposed on the supplier.

x. Warranty of the LPCs as per technical specification.

y. Any other expenses for successful completion of construction, test trial and delivery of the LPCs will be borne by the foreign shipbuilder/ supplier (which are not part of KSY scope).

z. KSY will arrange accommodation for foreign experts/ engineers/ technicians as per KSY rule. Cost in this regard will be borne by foreign shipbuilder/ supplier. Office facilities in KSY premises and local transportation (from KSY to Khulna city area) will be provided by KSY at own cost.

10. **KSY Scope of Supply**. KSY scope of supply will be as follows:

a. KSY will act as local shipbuilder to construct and deliver the subject mentioned project to BN.

b. KSY will construct, equip, install and complete the LPC in all respects under the supervision of the foreign shipbuilding experts/ machinery installation supervisors using the drawings, construction materials, machinery, weapons, sensors and equipment purchased by foreign shipbuilder/ supplier.

c. KSY will provide electrodes, gas, grinding stones for construction purposes.

d. KSY will bear cost for Non Destructive Test and Welders Certification.

e. KSY will arrange accommodation for foreign experts/ engineers/ technicians as per KSY rule. Cost in this regard will be borne by foreign shipbuilder/ supplier. Office facilities in KSY premises and local transportation (from KSY to Khulna city area) will be provided by KSY at own cost.

f. KSY will open the LC. KSY will bear all expenses related to LC Charges (for maximum two quarters; otherwise, foreign shipbuilder/ supplier will bear additional charges of LC), LC Margin, LC Confirmation Cost (if any), Marine insurance, Customs duty, C&F agent Commission, Port charges, Customs Clearance, Transportation cost (inside Bangladesh), etc.

g. Cost of Fuel Oil, Lub Oil, Grease, Water, etc. (if necessary) during test-trial and delivery will be borne by KSY.

h. KSY shall be responsible for furnishing the VAT, AIT, BG and PG to BN.

i. KSY will provide shipyard facilities and services for construction and delivery of LPCs.

11. **Offer Validity.** The offer should remain valid till 30 June 2026 from the date of submission of the offer.

12. **Selection Criteria.** The participants are to submit 01 (One) set of hard copy of both technical and financial offer in complete in single envelope (technical and financial offer should be in separate envelop). The technically suitable offer will be considered for financial selection process. However, company profile and experiences will also be a factor to select the suitable supplier. Upon submission of complete documents, the final bidder (most responsive) will be selected based on both technical and financial offer.

13. Interested supplier will have to submit the offer (hard and soft copy both) within the following deadline:

a. Technical offer documents with seal and sign by 18 January 2026 at 12:00 PM at email: plans@khulnashipyard.gov.bd

b. Financial offer documents with seal and sign by 18 January 2026 at 12:00 PM at email: ksygmdnp@gmail.com

14. Interested supplier is hereby requested to contact following person:

Commander Sadi Mohammad Raiyan, (E), psc, BN
Deputy General Manager (Design & Estimate)
Design & Planning Department
Khulna Shipyard Ltd, Bangladesh Navy, Khulna-9201
Cell: +8801769-784612 (whatsapp)

and

Md. Hasanuzzaman Tarek
Deputy Chief Engineer
Design & Planning Department
Khulna Shipyard Ltd, Bangladesh Navy, Khulna-9201
Cell: +8801670715428 (whatsapp)

A F M ENAMUL HASSAN
Captain BN
For Managing Director

Enclosure:

1. Technical Specification and List of Content - 01 (One) Set.

TENDER SPECIFICATION
FOR
CONSTRUCTION
OF
FOUR LARGE PATROL CRAFT
(TWO ASW LPC AND TWO ASuW LPC)
FOR
BANGLADESH NAVY (BN)
AT
GOVERNMENT-OWNED SHIPYARD OF BANGLADESH

CONTENTS

TENDER SPECIFICATION FOR CONSTRUCTION OF FOUR LARGE PATROL CRAFT (LPC) FOR BANGLADESH NAVY (BN)

SECTION-I

TERMS AND CONDITIONS

0101. **Preamble**. Four Large Patrol Crafts (LPC), two of Anti-Submarine Warfare (ASW) capability and two of Anti-Surface Warfare (ASuW) capability, will be constructed for the Bangladesh Navy (BN) in a government-owned shipyard of Bangladesh. The basic design of the LPC should be based on a proven hull design. The project will involve two parties: BN and a government-owned shipyard of Bangladesh. The government-owned shipyard of Bangladesh may collaborate with the foreign shipbuilders or their authorized principal/ agent. Here, BN is the **Purchaser**, and government-owned shipyard of Bangladesh will act as the **Supplier**.These LPCs should be certified by the International Association of Classification Societies (IACS) of BV/ LR regarding their design and construction. The roles of the LPCs are as follows:

a. **ASW LPC**. The primary role of the proposed LPC will be to conduct ASW operations with limited surface and self-defense capabilities. The ship should be able to detect, identify, track, engage, and attack hostile submarines. The secondary role of the proposed LPC will be to conduct coastal patrols and perform constabulary duties within the EEZ.

b. **ASuW LPC**. The primary role of the proposed LPC will be to conduct ASuW operations with self-defense capability. The ship should be able to detect, identify, and destroy surface targets. The secondary role of the proposed LPC will be to conduct coastal patrols and perform constabulary duties within the EEZ.

0102. **Scope of Supply**. The whole project of LPC construction will be executed in the following manner:

a. The Supplier will purchase all required items, like design and drawing, including construction drawing, construction materials, propulsion, auxiliary machinery and sensors, weapons, navigational aids, communication equipment, power generation and distribution plants, deck machinery, air conditioning and ventilation system, electrical and electronic equipment, galley equipment, stores, tools etc. from any reputed foreign shipbuilder or their authorized Principal/ Agent except those which would supplied by BN/ the Supplier.

b. The Supplier will also purchase other items where necessary, as per the contract. In general, BN supply will include small arms and diving sets.

c. The Supplier will construct, equip, and complete the LPC in all respects under the supervision of the foreign shipbuilding experts/ machinery installation supervisors using the drawings, construction materials, machinery, and equipment purchased by them.

0103. **Responsibilities of the Parties Involved**.

a. **BN**. The responsibilities of BN will be as follows:

(1) To approve an appropriate offer proposed by a suitable Supplier.

(2) To employ a project implementation team at the selected Supplier.

(3) To approve General Arrangement (GA) drawing, Compartment Arrangements (layouts), tank arrangements, firing arcs of weapons, hydrostatic curves, shell expansion drawing, etc., for the ship's production.

(4) To provide the following items from the BN stock:

(a) Small arms (with ammunition) and pyrotechnics.

(b) Diving gears.

(5) To conduct test & trial of the LPCs undertaken by the Supplier, experts of their authorized Principal/ Agent and foreign Shipbuilder manufacturer/ supplier of the concerned machinery/ equipment.

(6) To assist the Supplier in the exemption of customs duties, taxes, etc., for all equipment, machinery, and materials imported for the LPC.

(7) To accept the LPCs as per the contract.

(8) The test and trial completion certificate is to be signed jointly by the BN and Supplier.

b. **The government-owned shipyard of Bangladesh**. The Supplier will be responsible for the following:

(1) To propose appropriate offers from the bidders to BN for approval.

(2) To construct the hull and structure of the LPCs under the assistance /supervision of the foreign shipbuilder.

(3) To install all machinery, equipment, sensors (including all communication & navigation equipment such as RADAR, Gyro compass, Eco sounder, etc.), and fittings under the assistance/supervision of the foreign shipbuilder/concerned suppliers of the machinery as necessary.

(4) To install the Guns and Fire Control system under the assistance /supervision of the foreign shipbuilder/concerned suppliers. Necessary drawings, instructions, special tools/instruments, and guidelines are to be provided by the foreign shipbuilder/ concerned suppliers. The Supplier will hand it over to BN.

(5) To install Torpedo, ASW weapons, SONAR, and ASW Combat Management System (CMS)for ASW Ship under the assistance/supervision of the foreign shipbuilder / concerned suppliers. The foreign shipbuilder/concerned suppliers will provide the necessary drawings, instructions, special tools/instruments, and guidelines. The Supplier will hand it over to BN.

(6) To install Missile system with launchers, sensors, and Combat Management system (CMS) for ASuW Ship under the assistance/supervision of the foreign shipbuilder / concerned suppliers. The foreign shipbuilder/concerned

suppliers will provide the necessary drawings, instructions, special tools/instruments, and guidelines. The Supplier will hand it over to BN.

(7) To assist foreign shipbuilder or their authorized Principal/ Agent in conducting test, trial, and commissioning of all machinery, equipment, fittings, sensors, weapons, and systems as necessary.

(8) To arrange insurance of all equipment, machinery, and materials imported for the LPCs.

(9) To provide the following from the local market (optional, if not provided by the foreign shipbuilder) to encourage the local backward linkage industries (to be specified in the offer and subject to BN approval):

(a) RAS gear, Towing gear, DCFF equipment (as per Annex G and Annex K).

(b) Security equipment (locks and key arrangements).

(c) Furniture (portable only) and lavatory fittings.

(d) Entertainment equipment (like TV, DVD, etc.).

(e) Mess traps, mess utensils, and galley implements (as per Annex J).

(f) POL items including cooling water inhibitor, grease, refrigerant, and chemicals required for first filling and or test & trials and or till handing over to BN along with specification (subject to approval of foreign shipbuilder).

(g) Any other items small in nature and manufactured in Bangladesh (like flags/buntings, ship's bell, data plaque, safety chains, curtains, sofa covers, bedding items, ship's husbandry items, etc.).

(h) Minor items required for the regular operation of a warship; however, the allocated cost of these items should be mentioned by the bidder. BN will have complete freedom to choose the items available in the Bangladeshi market.

(10) To deliver the LPCs to BN as per the contract.

(11) The test and trial completion certificate is to be signed jointly by the Supplier and BN.

(12) The Supplier may collaborate with any well-established foreign shipbuilder(s) or their authorized principal/ agent and effect any agreement. However, the government-owned shipyard will be solely responsible and answerable to BN for implementing this project.

(13) The supplier will submit a preliminary Computational Fluid Dynamics (CFD) analysis during bidding the tender and a complete CFD analysis need to be provided during the signing of the contract.

(14) The Supplier will provide the after-sales warranty, supply of spares, and other services for the complete package of supply to BN.

0104. **Submission of Quotation**. The quotation must include the following:

a. Complete technical specification (make, model, type, and detailed technical particulars of machinery and equipment) of the LPCs.

b. Preliminary General Arrangement (GA) and Mid-ship Section Drawing of the proven LPC as well as offered LPCs.

c. List of LPC(s) built so far from the same proven hull design (based on the offered LPCs for BN) with names of owners and their present contact address.

d. Delivery Certificate of the proven LPC or LPC built on the same proven hull.

e. Tentative delivery schedule (with reference to the date of signing the contract) of the construction drawing & material, major machinery/ equipment, weapons, sensors, and other items for the construction of 4 in number LPCs.

f. Production schedule for construction (preeminent events related to the payment terms mentioned in this tender specification).

g. A set of design calculations and drawings, which may include the following:

(1) Preliminary tanks (POL, Fresh water, ballast, etc.) layout Plan with capacity.

(2) Preliminary Trim and Stability Booklet.

(3) Preliminary Damaged Stability Calculations.

(4) Preliminary Endurance and Sustainability Calculations.

(5) Preliminary Layout of armaments (with firing arc) and Magazines.

(6) Preliminary Arrangement of Accommodations.

(7) Preliminary Arrangement of Machinery-plan View.

(8) Preliminary Arrangement of Main Shafting.

(9) Preliminary Ventilation and Air Conditioning Diagram.

(10) Preliminary Arrangement of Electrical/Electronic Equipment.

(11) Preliminary Electrical Load Analysis.

h. In case of an offer from an authorized foreign Principal/ Agent, the bidder will provide the offer authorization certificate (original) from their Principal/ Agent.

j. Original certificates of providing after-sales warranty, supply of spares, and other services for the complete package of supply.

0105. **BN Project Implementation Team and Crew at Construction Site**. A project implementation team (consisting of at least 3 BN Officers, 3 JCOs/POs, and 5 Ldg & below) will remain at the construction site throughout the period of ship construction. The Supplier will provide the following facilities to BN personnel during their stay at the shipyard:

a. Private office room at or in the immediate vicinity of the shipyard with necessary office materials, including computer, printer, internet facilities, etc.

b. Local transportation facility for the team from and to the accommodation area and shipyard.

c. Accommodation facilities (non-family, including cooking facilities) for the BN Project Implementation Team and the total ship's crew during training till handing over the LPCs to BN

0106. **Bid Price and Terms of Payment**.

a. **Bid Price**. The quoted price (in Bangladeshi Taka) is to be broken down into the following components as per Annex A to C, from where BN will have the option to choose the whole or part of any component:

(1) Price of design package including all design, drawings, etc.

(2) Price of the construction material package.

(3) Price of propulsion machinery, its control systems, gearboxes, shafting, and propellers.

(4) Price of the electrical power generation and distribution system including all conversion machineries.

(5) Price of all auxiliary machinery and equipment.

(6) Price of all deck machinery.

(7) Price of electrical and electronic equipment (including navigational communication equipment, sensors, etc.)

(8) Price of ASW and ASuW Weaponry System and Armaments.

(9) Price of mandatory spare parts in accordance with Article 1201.

(10) Price list of spare parts for 5 (five) years for smooth operation.

(11) Price of general tools, special tools, and test equipment.

(12) Cost of Orientation Training on operation and maintenance of machinery, equipment, and systems in accordance with Article 1208.

(13) Cost of services of shipbuilding experts, machinery installation experts, etc., related to construction.

(14) Cost of services related to construction.

(15) VAT, IT, AIT, Customs duty, and any other charges/ duties.

b. BN reserves the right to accept the whole or part of the offer, considering the economic viability.

c. **Special Conditions**. In general, the construction material, machinery, and equipment purchased for building LPCs will be considered as Defense Stores. These Defense Stores shall be used by the Defense Forces only and hence are exempted

from payment of customs duties and sales taxes as per Ministry of Commerce, the Government of People's Republic of Bangladesh (NBR) Memo No 9 (41) NBR/ Cus-IV/72/246 dated 10 Apr 1981.

d. **Payment Terms and Schedule**.2 X ASW LPCs and 2 X ASuW LPCs (a total of 4 in LPCs) will be constructed within the prescribed period of time. Payment for each category of LPCs shall be made through bills/documents submitted by the Supplier to BN. All payments shall be made in local currency (BDT). Payment schedule for each category of LPCs (2 X ASW LPCs and 2 X ASuW LPCs) will be under the following terms and conditions:

(1) 20% of the Total Contract Price (TCP) of Four LPCs is to be paid on signing of the contract and submission of the provisional GA drawing, and submission of a Bank Guarantee equivalent to 20% of the TCP.

(2) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on keel laying of 2 X ASW LPCs and submission of keel laying certificate endorsed by BN.

(3) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on keel laying of 2 X ASuW LPCs and submission of keel laying certificate endorsed by BN.

(4) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on submission of Commercial Invoice (CI) copies for the procurement of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASW LPCs and endorsed by BN.

(5) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on submission of Commercial Invoice (CI) copies for the procurement of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASuW LPCs and endorsed by BN.

(6) 10% (5% for each ASW LPC) of the Total Contract Price (TCP) will be paid on completion of construction up to deck level of 2 X ASW LPCs and on arrival of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASW LPCs and a certificate endorsed by BN.

(7) 10% (5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid on completion of construction up to deck level of 2 X ASuW LPCs and on arrival of main engines, gearboxes, generators, shafting, and steering equipment of 2 X ASuW LPCs and a certificate endorsed by BN.

(8) 5% (2.5% for each ASW LPC) of the Total Contract Price (TCP) will be paid upon launching of 2 X ASW LPCs and submission of the launching certificate endorsed by BN.

(9) 5% (2.5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid upon launching of 2 X ASuW LPCs and submission of the launching certificate endorsed by BN.

(10) 5% (2.5% for each ASW LPC) of the Total Contract Price (TCP) will be paid upon satisfactory Test, Trial, and Final Acceptance of 2 X ASW LPCs by the BN Acceptance team.

(11) 5% (2.5% for each ASuW LPC) of the Total Contract Price (TCP) will be paid upon satisfactory Test, Trial, and Final Acceptance of 2 X ASuW LPCs by the BN Acceptance team.

0107. **Delivery Schedule**. Four LPCs are to be constructed, tested, trialed, and delivered within 48 months from the contract effective date.

0108. **Bank Guarantees**.

a. The Supplier shall furnish to DGDP a BG upon signing the contract (as a precondition of payment of the first installment) for an amount equivalent to 20% of the TCP from any scheduled bank situated in Bangladesh in favor of Senior Finance Controller (Navy), Lalasarai, Sailors Colony. Mirpur-14, Dhaka-1206, Bangladesh. This BG shall be released upon submission of the GA drawing for the last LPC.

b. **Performance Guarantee (PG)/ Bond**. On behalf of BN, the Supplier shall ensure, upon signing the contract that a PG for an amount equivalent to 5% of the contract price is issued by the Supplier through any scheduled bank of Bangladesh designated by the Supplier. This PG shall be valid till satisfactory test, trial, and acceptance of each LPC to BN, i.e., 50% of the total PG shall be released (with intimation to BN) after successful acceptance of each LPC.

c. **Guarantee for Warranty**. The Supplier shall furnish to DGDP a bank guarantee for warranty after satisfactory handing over of each LPC for an amount equivalent to 5% (Five percent) of the total contract price (i.e.,1.25% for each LPC), which shall remain valid until the expiry date of the warranty period.

0109. **Warranty Repair / Replacement**. The bidder shall undertake the full responsibility to rectify, free of charges to BN, any defect in any of the LPC 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, provided that the defects are appeared/discovered during the period of 12 (twelve) months after delivery of each LPC. Warranty repair/replacement shall be accomplished within 3 months of notification of the relevant defect. Otherwise, the warranty will be extended by the equipment's non-operational period.

0110. **Legal and Financial Issues**. All legal and financial issues mentioned in this specification are to be fully complied with/ agreed upon by the bidder. BN will have the option to cancel the bid if such compliance is not agreed upon by the bidder during evaluation and negotiation to finalize the contract specification. Besides, all legal issues will be governed by DP-35.

0111. **Special Terms**. Special terms/ conditions to be incorporated into the Contract and adhered to by the bidder at the time of signing the Contract are set out in Annex D. The bidder is to clearly state their agreement to these terms /conditions while submitting the offer.

0112. **Equipment/System Quality and Their Functional Integrity**. Every equipment or system shall be brand new, unused and fully functional as per role/purpose of the equipment. Each equipment/system shall be of proven design and will have several naval/marine applications onboard any Naval/Coastguard ships. No equipment/system under R&D or Trial will be accepted.

0113. **Standard Documentation for Equipment/System Technical Handbook/Manual**. Supplier is to provide related technical handbook/manual of equipment/system which are written and published to the standards in eight categories. One category item may have one or several books. Even one book may contain more than one category items. The categories are as follows:

a. Category 1: Purpose and Planning Information; Summary of Data.

b. Category 2: Operating Information; Operational Description; Drill.

c. Category 3: Technical Description; System and Equipment Levels.

d. Category 4: Installation; Preparations for Acceptance; Trial Schedules.

e. Category 5: Maintenance Information and Instructions.

f. Category 6: Planned Maintenance Schedules.

g. Category 7: Parts Catalogue.

h. Category 8: Modifications.

0114. **Article-wise Compliance Sheet**. Article-wise compliance with the purchaser's Technical Specification of LPC is to be provided. The bidders should clearly state whether they comply with the purchaser's requirements and offers as set out in the various articles of the tender specification. For any deviation from that, it is to be clearly mentioned in the offer. A blank format is given as Annex L.

SECTION-II

GENERAL CHARACTERISTICS

0201. **Functions.** The LPCs are to serve the following primary and secondary roles:

a. **ASW LPC**.

(1) **Primary**. The primary role of the proposed LPCs will be to conduct ASW operations with limited surface and self-defense capabilities. The ship should be able to detect, identify, track, engage, and attack hostile submarines.

(2) **Secondary**. The secondary role of the proposed LPCs will be to conduct coastal patrols and perform constabulary duties within the EEZ.

b. **ASuW LPC**.

(1) **Primary**. The primary role of the proposed LPCs will be to conduct ASuW operations with self-defense capability. The ship should be able to detect, identify, and destroy surface targets.

(2) **Secondary**. The secondary role of the proposed LPC will be to conduct coastal patrols and perform constabulary duties within the EEZ.

0202. **General Descriptions**.

a. Should be capable of operating in tropical conditions.

b. Should have an expected life of a minimum of 25 years.

c. Normal refit interval - 3 years.

0203. **Displacement at Full Load**. 720 tons (± 5%) tons (to be mentioned).

0204. **Dimensions**.

a. **Length (overall)**. Not less than 64 m (to be mentioned).

b. **Breadth**. Not less than 9 m (to be mentioned).

c. **Draught**. Not more than 4m (full load with any projection) (to be mentioned).

(1) Base line of the vessel shall be taken along the molded line of the keel, which shall represent the reference plane for all vertical measurements, including the draught (to be mentioned).

(2) In case of the sonar dome projection below baseline (for ASW LPCs), the projection shall be explicitly mentioned and added to the draught.

(3) In case of any other projection below baseline, the projection shall be explicitly mentioned and added to the draught.

(4) The final draught of the vessel shall be taken as the sum of the molded draught measured from the baseline (keel line) plus the maximum projection of any appendage or fitting located below the baseline. The total draught, inclusive of such projections, shall in no case exceed 4 m at full load displacement.

0205. **Speed**.

a. **Maximum speed**. Not less than 24 Knots.

b. **Maximum continuous speed**. To be mentioned.

c. **Economic speed**. To be mentioned.

0206. **Endurance**. Not less than 2500 NM at economic speed.

0207. **Propulsion**. The propulsion system should consist of the following:

a. Two in number four-stroke marine diesel engines capable of developing sufficient power required to attain the maximum ship's speed mentioned in this specification- Western origin and manufactured (USA, UK and EU Countries) of standardized brand (Caterpillar, MAN Diesel, MTU, Wartsilla).

b. Two reverse-reduction gearboxes, one connected to each propulsion diesel engine- Western origin and manufactured (USA, UK, EU Countries).

c. Two shafts (Country of Origin and Manufacture to be mentioned).

d. Steering system including emergency provision- Western origin and manufactured (USA, UK, EU Countries).

e. Associated auxiliary machineries with necessary secondary options- Western origin and manufactured (USA, UK, EU Countries).

0208. **Maneuverability**. The hull, propulsion, and steering system of the LPCs will be such that they can have excellent maneuverability, including;

a. Short Stopping length from complete ahead to stop. (To be mentioned).

b. Small Turning diameter. (To be mentioned).

c. LPC's vital machinery and equipment are to be capable of operating satisfactorily under the following conditions:

(1) Permanent trim: Up to 5°.

(2) Permanent list: Up to 15°.

(3) Pitching: Up to 10°.

(4) Rolling: Up to 45°

0209. **Power**.

a. 3 x Identical Main Genset and 1 X Emergency Genset will be supplied as per the BN's standardized model mentioned in article 0707.Each Genset independently should able to take full load (operational and combat) with at least 5% surplus power.

b. DC power backup (For emergency power supply for navigational equipment/ lights, etc., for her safety at sea).

c. Facility for shore supply connection.

d. Solid state/required conversion equipment.

e. 2 x Switchboard of warship standard with paralleling capacity, each capable of taking the full load of the ship.

f. Generators should be of Western origin and manufactured (USA, UK, EU Countries). Country of original manufacturer or countries that manufacture Western-origin engines and possess a bona fide certificate/license from the original engine manufacturer (Western)will be considered. The manufacturer's country of origin must be mentioned.

0210. **Seaworthiness**.

a. **Damaged Stability**.

(1) The LPCs should be able to remain stable even if any two adjacent main transverse watertight subdivisions are flooded.

(2) The ship's buoyancy and stability are ensured even if three adjacent aft and fore extreme compartments are flooded.

b. **Sea Keeping**. The stability of the LPCs shall comply with the International Stability Criterion of the IMO SOLAS regulation. Preliminary capacity plan and stability curves under different loading conditions are to be submitted with the quotation. The LPC should be able to operate in sea state five and withstand and sustain sea state seven. The stability of the LPCs shall comply with internationally accepted stability regulations.

0211. **Complement**. The ship should accommodate at least 75 personnel (including at least nine officers).

0212. **Construction**.

a. Hull should be constructed by marine AH 36/ AH 40 High Tensile Mild Steel Plate or higher grade, certified by any member of IACS.

b. Superstructure may be constructed with a shipbuilding quality class-approved Aluminum plate using a strong and standard high-quality Bimetallic Joint.

c. A classification society shall be appointed (IACS) for supervision/ inspection and/ or certification on behalf of BN.

0213. **Design**. The offered LPC should be in use, preferably in at least one country, for at least the last 2 years.

0214. **Place of Construction**. Government-owned shipyard of Bangladesh.

0215. **Project Duration**: 4 X LPCs will be constructed within 48 months of the contract effective date.

0216.**Special Features**. The ship should be capable of towing another vessel of similar size and shape and being towed by another vessel of similar size and shape. Therefore, the vessel should have arrangements astern for towing and in Fox'l for being towed.

0217.**Ops Room/ Combat Centre**. Both ASuW and ASW LPCs should have compatible Operations rooms, including a Combat Information Centre (CIC),a Combat Management System (CMS) for ASuW LPC, and Standalone ASW Combat Management System for ASW LPC, an EW suite, and an Integrated Communication System (ICS).

0218.**Signature**. All signatures should be a minimum. Sharp-bended (right-angled) superstructure and high-temperature objects on the upper deck should be avoided. The shafting and propeller arrangements are to be designed for low noise. All heavy vibrating machinery should be mounted on special noise-absorbing mounts.

0219. **Armament**. The LPCs are to have the following armaments:

a. **ASW LPC**.

(1) 2 Sets of twin/ triple tube ASW Torpedo launchers with Standalone ASW Combat Management System.

(2) 1 x 30mm gun RCWS with associated FCS.

(3) 2 x 12.7 mm guns with RCWS with associated FCS.

(4) Facility for laying mines.

(5) ASW Decoy(Bidder may quote as an optional item. The price of ASW decoy shall be mentioned separately and shall not include with the main offer price, Country of OEM to be mention).

(6) 4 x VSHORAD (Storage Facilities).

(7) Chaff Rocket Launcher.

b. **ASuW LPC**.

(1) 4 x SSM with associated CMS.

(2) 1 x 30mm gun RCWS with associated FCS.

(3) 2 x 12.7 mm guns with RCWS with associated FCS.

(4) Facility for laying mines.

(5) 4 x VSHORAD (Storage Facilities).

(6) Chaff Rocket Launcher.

0220. **Navigation, Direction and RADAR**.

a. **Navigational Equipment Including RADAR**.

(1) Standard Nav-aids (including Navigational RADAR, GPS, Echo Sounder, W-AIS, Speed Log, Gyro Compass, Gyro compass INS, etc.) enabling them to operate at sea.

(2) Integrated Electronic Chart covering the Bay of Bengal and adjacent areas.

b. **Search RADARS**. Air and Surface Search RADAR compatible with Fire Control System.

c. **Electro-optic Tracker**. Electro-optic system with a IR sensor and a laser rangefinder.

d. **Meteorological Arrangements**. Standard meteorological equipment.

e. **Underwater Sensors (Only for LPC – ASW)**.

(1) Hull-mounted Sonar with associated system.

(2) Underwater telephone and bathythermograph (integrated with SONAR/ separate).

(3) Standalone ASW combat management system that will have backup function for information from SONAR to FCC (ASW)

0221. **Communication and EW**.

a. **Radio Communication**.

(1) Standardized BN communication equipment (HF, VHF/UHF, Marine VHF, and Bijoy-50) with data, CW, and voice, including crypto facilities. HF must include a voice encryption system.

(2) Walkie-talkie sets for internal communication.

(3) Air Band walkie-talkie for ship-to-aircraft communication.

(4) Satellite telephone facilities.

(5) Data Message Terminal (DMT).

b. **Visual Signaling**.

Standard Light and flag signaling facilities	2 x Flag locker	For flag storage
	1 x VS store	For the storage of VS communication items
	4 x Semaphore pair	For VS communication
	6 x Black ball	
	4 x Black diamond	

	Dressing line	
	6 x Signal projector	
	All-round flashing light on the mast	
	National flag	For ceremonial purposes
	BN ensign	
	BN jack	
	2 sets of Distinguishing flags and pennants	

c. **EW Equipment**.

(1) Standard ESM.

(2) Chaff (S & D).

(3) IR Decoy.

d. **Internal Communication System**.

(1) The Integrated Communication System (ICS) of CIC should also include the Internal Telephone System, Internal Broadcast System, Gun Intercom System, and Machinery Intercom System.

(2) Internet LAN facilities.

(3) Central TV receiving system, etc.

e. **IFF, Data Link and VSAT Terminal**.

(1) BN IFF (GFE) will be provided by BN. It is the Bidder's responsibility for integration of IFF System with offered Search Radar. BN will provide necessary integration support.

(2) Tactical Data Link with HF/VHF will be provided by BN. It is the Bidder's responsibility for integration of TDL with offered CMS. BN will provide necessary integration support.

(3) VSAT Terminal (GFE) will be provided by BN. It is the Bidder's responsibility for integration of VSAT with offered ICS. BN will provide necessary integration support.

0222. **Accommodation**.

a. **Accommodation System**.

(1) Standard accommodation to be catered for the total complement.

(2) Required toilet, shower and washing facilities for the ship's complement.

b. **Ventilation and Air Conditioning**.

(1) Central air-conditioning system (Ducted HVAC System) for operational and living spaces with alternative arrangements.

(2) The compressor of the Central Air Conditioning system is to be Semi-Hermetic.

(3) The AC plant must be compatible with the sea environment of the Bay of Bengal.

(4) Adequate forced and natural ventilation for other spaces.

0223. **Logistic Arrangement**.

a. **POL**. Fuel, oil, and lubricants stowage facility for the stated endurance (Fuel: Usable amount not less than 1,00,000 liters).

b. **Storage and Refrigeration Facilities**. Storage facilities for the following are to be provided:

(1) Dry provisions for 15 days.

(2) Fresh provisions for 10 days.

(3) Naval, Engineering, Electrical and Bos'n stores facilities, including NSKO.

c. **Ammunition**.

(1) Stowage facilities for the ammunition of the armament should be specified.

(2) Armory, Pyrotechnic Locker, and Web equipment store facility. **(DNAIS OBS 11)**

d. **Fresh Water**.

(1) Adequate fresh water tank for the required complement, endurance, and mission length (Usable amount to be not less than 40 tons).

(2) RO plant having provision for generating not less than 5 tons of Fresh water per day.

e. **Cooking Facilities**.

(1) Standard cooking facility for the ship's complement.

(2) Separate pantry for officers, Senior rates, and Junior sailors.

(3) Standard dining facility for officers, Senior rates and Junior sailors.

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

(5) A separate pantry for officer dining is to be provided.

0224. **Miscellaneous**.

a. **Shock, Vibration And Noise**. The Shock and Vibration standard should account for the cumulative effects of machinery, equipment, weapons, and weather.

(1) The shock standard should fulfill the cumulative thrust of weapons and weather. The LPCs are to be designed and constructed to limit vibration to a level that neither results in discomfort/annoyance to the crew nor causes damage to/ malfunctioning of, or a reduction in performance of the machinery, equipment, or the structure. Shock and vibration mountings, in accordance with the class standard for shock resistance, are to be provided.

(2) Necessary sound insulation and isolation are to be provided to keep the sound levels within the limits, which will not result in discomfort to the crew, speech interference, or deafness problems. Noise levels in the following spaces need to be mentioned during maximum continuous speed:

(a) Engine control room :To be mentioned

(b) All living spaces :To be mentioned.

(c) Wheelhouse :To be mentioned

(3) To reduce the noise of propulsion engines, diesel generators, and other auxiliary machinery, appropriate mounting with due elasticity should be incorporated into the design.

(4) Torsional vibration calculation for the shafting system will have to be made in the design stage to ascertain the acceptable vibration levels.

(5) During test and trials (HAT and SAT), the vessel shall be subjected to vibration, shock, and noise level measurements under various operating conditions. The results of these trials shall clearly demonstrate that the vibration, structural response to shock, and onboard noise levels remain within acceptable naval standards and do not impair habitability, mission performance, or equipment operation. The shock, vibration, and noise levels are to be measured using appropriate devices/equipment and certified by the classification society.

b. **Protection Against Marine Pollution**. LPC will have the necessary IMO-approved means for the disposal of garbage, oily water, sewage, and other wastes.

c. **DCFF/ Emergency requirement**.

(1) Standard Fire Fighting and Damage Control equipment as needed.

(2) Fixed firefighting arrangement for machinery space.

(3). Standard first aid and limited medical support facilities.

(4) DCFF gear store facility.

d. **Life Saving Equipment**.

(1) Life Saving Equipment to be included for the total complement as per IMO/ SOLAS standard.

(2) 1 x Rigid Hull Inflatable Boat (RHIB) including outboard engine.

(3) Standard GMDSS Equipment with a minimum 1 X DSC VHF Set, 1X DSC MF/HF Set, 1X EPIRB, and 2 X SART.

e. **Diving Equipment**. Standard Diving Equipment, including charging facilities for a complete diving team. The details list is attached in Annex H.

f. **Deck Crane**. 1 x Deck Crane for hoisting and lowering RHIB and stores.

g. **Other Equipment/ Facilities**.

(1) FIN Stabilizer.

(2) ICCP.

(3) Degaussing System.

(4) Standard office equipment.

(5) Recreation and indoor games facilities.

h. **General Fitting**. Standard fittings/Equipment for general operations as necessary for similar kinds of warships, as per Class Rules.

j. **Documents**. Appropriate drawings, designs, documents, manuals, certificates, etc. should be provided in the English language. The list of certificates will include, but not be limited to, the following:

(1) Certificate issued by an internationally recognized classification society for the primary and auxiliary machinery and equipment.

(2) International Tonnage Certificate.

(3) Builders Certificate.

(4) Certificates for a fixed firefighting system.

(5) Inspection/ Test Certificate for anchor and chain cables.

(6) Magazine safety certificate.

(7) Any other certificates required for the classification of the LPC.

0225. **Classification**. The LPCs should be of warship design and standard. The classification/ standard of hull, structure, machinery, equipment, and fittings of the LPCs should be of the classification/ standard of a naval warship. The LPCs must be built in accordance with the warship-building standards of an internationally recognized classification society. The classification society referred to here must possess the following criteria:

a. Classification Society for the construction of LPCs must be BV/ LR (Member of IACS).

b. Classification society having recent records of supervising the design and construction of warships/ marine vessels.

0226. **Standard**. In addition to the class requirement for hull, machinery, and equipment, the internationally recognized classification society's standard shall be followed in respect of the following:

a. Subdivision and stability.

b. Tonnage calculations.

c. Lifesaving appliances.

d. Crew accommodation.

e. Firefighting appliances.

f. Doors, windows, hatches, and openings.

g. Safety of navigation (lights and sound signals).

h. Noise and vibration.

j. Safety of firing arcs.

SECTION-III

DESIGN AND DRAWING

0301. **Introduction**. The proven Large Patrol Craft, on which the offered LPC will be customized, should be in use, preferably by at least one country, for at least the last 2 years. The design criteria of the PCs will be as follows:

a. The LPCs will be designed and constructed to meet warship standard as per class rules with respect to subdivision, stability, structure, shock, vibration, noise, EMI, thermal radiation, firefighting safety of life at sea, etc.

b. Vital machinery and systems onboard, e.g., propulsion, electric power generation and distribution, navigation, communication, etc., will be in accordance with the class standards.

0302. **Design Philosophy**. The design philosophy of the LPCs shall be as follows:

a. Easy to operate.

b. Easy to maintain.

c. Increased availability for operation.

d. Good sea-worthiness.

e. Good habitability.

f. Enhanced survivability.

g. Minimum ship's signature.

h. Lower life-cycle cost.

j. Warship appearance.

k. Capable of fighting.

0303. **Design Criteria and Standards**.

a. The LPC is to be designed and constructed in accordance with the latest naval ship design criteria and standards with respect to subdivision, stability, structures, shock, vibration, noise, EMI, NBC protections, firefighting, and vital systems (propulsion, power generation, navigation, and communication systems).

b. Standards of Commercial equipment and non-vital systems will be subjected to the acceptance of such standards by the buyer.

c. Weapon, sensor system, and other aspects not covered by the classification society’s naval rule will be as per the military standard.

0304. **Design**. The design of the offered LPCs must be based on a proven hull design, which shall mean the following:

a. Ships with a similar proven hull design are already in service with any Navy/Coast Guard.

b. The offered ships may differ from the ships in service in General Arrangement (GA), type/model of machinery, equipment, systems, or armament to meet the tender requirements, provided that the basic hull design (including principal particulars and hydrostatic particulars), displacement, and stability characteristics must remain essentially unchanged and acceptable to the buyer. However, the ship's design should be modern and well-configured.

c. The bidder is to provide with the quotation a certificate of authority in original from the designer stating that the offer is based on a proven hull design. This certificate must also contain the name(s) of vessel(s) built as per the said proven hull design.

0305.**Certificate for Proven Design.** A certificate from the designer, in the original, stating that the design is based on a proven hull design and authorizing the selected Supplier to use the design, along with modifications as required for the LPCs in Bangladesh, needs to be provided.

0306. **Classification**. The design and drawings of the proposed ship are to be approved by BV/ LR (Member of the International Association of Classification Societies (IACS)). However, all basic drawings are to be endorsed by the classification society, including the following:

a. Report of inclining test.

b. Calculation of intact stability

c. Calculation of damage stability.

d. Fire control plan.

e Damage control plan.

0307. **Scope of Supply**. The selected Supplier must supply the design package and all copies of construction drawings (including machinery/equipment/items installation drawings) for the LPCs to be built. All drawings must be provided on drawing paper that will last as long as the ship’s shelf life. A Full set of final drawings (as constructed) needs to be provided after a satisfactory test trial of the LPCs.

0308. **Drawings & Test Results**.

a. The following drawings of the 4 (four) LPCs are to be provided for approval of BN before construction:

(1) General arrangement drawing with principal particulars.

(2) Lines plan.

(3) Scantling of hull and superstructure.

(4) Machinery and Equipment Layout.

(5) Arrangement and layout of Armament.

(6) Preliminary stability booklet including Hydrostatic Curves at different loading conditions.

b. Final drawings mentioned in the article 0311 are to be provided at the time of delivery of the LPCs. Minor deviations, within an acceptable limit, between the preliminary and final drawing may be considered by BN.

0309. **List of Drawings**. A complete list of drawings that are to be supplied must be submitted with the offer.

0310. **Delivery Schedule of Construction Drawings**. The delivery schedule of the construction drawings shall be as follows:

a. **Basic Drawings**. The basic drawings related to hull, superstructures, etc. are to be supplied within 3 (three) months after signing the contract, so that the Government-owned shipyard will be able to start ship construction, which includes:

(1) General Arrangement.

(2) Accommodation Arrangement.

(3) Tank Arrangement.

(4) Machinery Space Arrangement

(5) Arrangement of Weapons and Sensors.

(6) Firing arcs and Weapons. BN will provide details of guns and weapons within one month after the contact effective date.

(7) Arrangement of major Electrical/Electronic (Gyro, Radar, etc.) equipment.

b. **Other Drawings**. All other drawings related to machinery installation, fittings, fixtures, etc.,are to be supplied as required to maintain LPC's construction work schedule, but no later than 9 (nine) months after the contract effective date.

0311. **As a Fitted Finished Drawing Package**. Nine copies (one for each LPC, one each for NHQ, BN Dockyard Chittagong, BN Dockyard Mongla (Adhoc), Base Workshop Khulna, and KSY) of each drawing are to be supplied in linen paper, suitable for ammonia printing, and in electronic format. The drawings which will be supplied shall include, but will not be limited to, the following:

a. **Basic Drawings and Booklets**.

(1) Draft Mark, Hull No & Ship’s Name Arrangement.

(2) General Arrangement.

(3) Arrangement of Weapons and Sensors.

(4) Firing arcs and Weapons. BN will provide details of guns and weapons within one month after the contact effective date.

(5) Tank Capacity Plan.

(6) Sounding Table.

(7) Damage stability booklet.

(8) Hydrostatic data/curves.

(9) Procedure of inclining experiment.

(10) Procedure of sea trial.

(11) Bonjean Curve.

b. **Building Drawing**.

(1) Sheer draught and table of offsets.

(2) Profile.

(3) Upper and forecastle deck.

(4) Lower deck and hold.

(5) Structural section.

c. **Hull Part**.

(1) Midship section.

(2) Construction Profile.

(3) Shell Expansion.

(4) Engine Room Construction.

(5) Midship Construction

(6) Bow Construction.

(7) Stern Construction.

(8) Deck House Construction.

(9) Rudder Construction.

(10) Painting Scheme.

(11) Zinc Anode Arrangement.

(12) Shaft Strut

(13) Docking Plan and alternate docking plan.

(14) Tank testing plan (Hull Tightness Test Plan).

(15) Tank Arrangement Plan.

(16) Arrangement of the bottom plug & bulkhead mark.

(17) Welding procedure & details.

(18) Arrangement of bilge keel.

d. **Outfitting Part**.

(1) Access and Closing Arrangement.

(2) List of key & cabin name plate.

(3) Mast Construction plan.

(4) Arrangement of natural Ventilation.

(5) Air-Con Room Arrangement.

(6) Heating, Ventilation, and Air Conditioning Diagram.

(7) Bridge (Pilot house) window washing arrangement with a wiper.

(8) Arrangement of duct plan.

(9) Chilled Water Diagram for Air-Conditioning.

(10) Fire Fighting plan.

(11) Arrangement of the steering Gear Room, including piping arrangement.

(12) Arrangement of Boat Crane Handling.

(13) Anchor Gear and Hawse Pipe Arrangement.

(14) Mooring and Towing Arrangement.

(15) Details of mooring fittings.

(16) Ship’s Bow Name.

(17) Jack Staff and Ensign Staff Arrangement.

(18) Fire Hose Rack Arrangement.

(19) Arrangement of Handrail and Life Line.

(20) Arrangement of an inclined and Vertical Ladder.

(21) Jacob's ladder Arrangement.

(22) Pilot Ladder Arrangement.

(23) Arrangement of Refrigerating Machine and Plant, including piping arrangement.

(24) Bos’n Store Arrangement.

(25) Paint Store Arrangement.

(26) Ready Service Room Arrangement.

(27) Ammo. Magazine Arrangement.

(28) Grating for ammo. Store.

(29) Armament mountings, angles of bearing, and depression.

(30) Magazine spraying arrangement.

(31) Pumping arrangement.

(32) Voice pipe arrangement (if necessary), Rigging arrangement.

(33) Identification markings of compartments, hatches, doors, valves, etc.

(34) Small Arms Store Arrangement.

(35) Drainage Plan.

(36) Sanitary Piping Plan

(37) Exposed deck planning arrangement.

(38) Fire Line Remote Control Arrangement.

(39) Outfitting practice

(40) Hold/Tank/Void space.

(41) Plan of piping general arrangement

(42) Ventilation and Air Conditioning diagram.

(43) RHIB seating arrangement.

(44) RHIB lowering and hoisting arrangement.

e. **Accommodation**.

(1) Window and Scuttle Plan.

(2) Deck Covering Plan

(3) Insulation Plan.

(4) Cold and Cool Room Arrangement.

(5) Accommodation Arrangement (1:25 Scale).

(6) Furniture List.

(7) Sanitary and Laundry Arrangement.

(8) Galley Arrangement.

(9) Pantry space Arrangement.

(10) Dry Provision Store Arrangement.

(11) Cabin Door Arrangement.

(12) Colour Scheme Book and List.

(13) Flag locker arrangement.

(14) Firefighting apparatus arrangement.

f. **Machinery Equipment**.

(1) Engine installation.

(2) Machinery Space Arrangement.
(3) Reduction Gear installation.
(4) Arrangement of Machinery Space (Plan).
(5) Arrangement of Machinery Space (Section).
(6) Machinery Removal Route Layout.
(7) Shafting Detail and Arrangement.
(8) Control Air System Diagram.
(9) Exhaust Gas Pipe Diagram (in Engine Room).
(10) Sea Chest Valve Arrangement (Engine Room).
(11) Shipside Valve Arrangement (Engine Room).
(12) F.O. Service System Diagram.
(13) F.O. Fill and Transfer System Diagram.
(14) L.O. Service and Filling System Diagram.
(15) Aux. S. W. Cooling System Diagram.
(16) M/E and A/E S. W. Cooling System Diagram.
(17) M/E and A/E F. W. Cooling System Diagram.
(18) Compressed Air System Diagram.
(19) F/W and H/W Service System Diagram.
(20) Air Escape, Sounding, and Overflow Diagram.
(21) Valve list.
(22) Arrangement and detail for a quick closing valve,
(23) Instrument List.
(24) Hydraulic Oil System Diagram.
(25) Sanitary System Diagram.
(26) On-board test procedure.
(27) Piping Practice

g. **Electrical Equipment**.

(1) Ship's Main Electrical Schematic/System Drawings.
(2) Arrangement of Electrical/Electronic Equipment.
(3) Benchmark (standard platform and foundation).
(4) Arrangement of antenna extension.
(5) Fire and Bilge alarm system.
(6) Short Circuit Calculation.

(7) Electrical Load Analysis.

(8) Illumination Calculation.

(9) Voltage Drop Calculation.

(10) Wiring diagram of the power system.

(11) Wiring diagram of the lighting system.

(12) Wiring diagram for control & instrumentation.

(13) Wiring diagram for the communication & navigation system.

(14) Wiring diagram & arrangement of the fire & general alarm system.

(15) Arrangement of navigation Lights.

(16) Wiring diagram of internal communication equipment.

(17) Arrangement of the main switchboard, including a functional diagram.

(18) Arrangement for the emergency power supply system.

(19) Cable installation diagram (inboard primary cable route schematic).

0312. **Special Condition**. The above list of drawings will act as a guideline only. The bidder must supply all other drawings, circuit diagrams, fault finding diagrams and manuals of all relevant to the LPC and equipment's which include but not limited to Generators, Weapon system, FC System, Combat Management Systems, Guns, Torpedo, SONAR, Radar, Gyro, Log, Radio sets, and other electrical and electronic equipment are to be supplied complete in all respect.

0313. **Certification**. Relevant certificates issued by a classification society are to be provided by the government-owned shipyard with the drawing.

0314. **Certification Fees**. All fees regarding certification of the drawings are to be borne by the government-owned shipyard.

SECTION-IV

HULL AND STRUCTURE

0401. **General.** The following paragraphs describe some of the requirements of the hull and structures. The hull and structure are to be designed and constructed in accordance with the class requirements. The main hull is to be of welded steel construction. The superstructure is to be of a marine-grade aluminum alloy welded structure. The main hull and superstructure are to be connected by strong and standard bimetallic transition joints. Anything not explicitly mentioned in these paragraphs shall in no way relieve the bidder from the obligation to supply the LPC complete in all respects.

0402. **Material and Workmanship**. Material and quality of the hull and structure will fulfill the following requirements:

a. The main hull is to be of AH 36/ AH 40 high tensile mild steel plate or higher grade, certified by the classification society.

b. The superstructure is to be of corrosion-resistant shipbuilding quality marine grade aluminum alloy.

c. AII materials, to be used in ship construction, are to be brand new, high-quality, and suitable for marine construction.

d. All rubber materials, to be used in the ship construction, shall be of high-quality marine standard and shall meet the requirements of BN demand/ technical specification.

e. All wood to be used in the ship is to be well seasoned and marine standard teak/ mahogany, and it is to be free from saps, shakes, warps, and other defects.

f. Workmanship throughout the LPC is to be of the highest marine standard in accordance with the class rules.

0403. **Construction**. All work is to be carried out to high-quality marine construction standards. All welding is to be in accordance with welding procedures. The welding of the hull and superstructure is to be such that the main welds are continuous on both the inside and the outside. All weld spatter, soot, and construction scars are to be removed or faired. All sharp edges and corners are to be dressed to prevent hazards to personnel and equipment. The structural design and details of construction are to be made to avoid unacceptable noise and vibration

0404. **General Arrangement**. The LPC is to be arranged to have the following accommodation, working spaces, tanks, stores, etc.:

a. **Accommodation**. Details given in section V (articles 0543to 0545)
The brief requirement is below:

(1) 1 (one) single-tier cabin for CO with a private lavatory.

(2) 1 (one)single 2-tier cabin for officers.

(3) 2 (two)double 2-tier cabins for officers.

(4) At least 3 in no accommodation facilities for 66 sailors with a separate mess for JCOs, POs, and Ldg & Below are to be considered.

b. **Utility Compartments**. Details given in section V (articles 0543 to 0545), the brief requirement is below:

(1) Wardroom facility for officers as per the GA drawing.

(2) Dining/recreation room for all ratings (Separate enclosure for senior ratings).

(3) Common Galley facility for Officers and Sailors.

(4) Commanding Officer's sanitary space.

(5) Officers' sanitary space.

(6) Senior ratings' sanitary space.

(7) Junior ratings' sanitary space.

c. **Working Compartments and Rooms**.

(1) Closed bridge with chart table, navigation and communication equipment, or modern variants, etc. Including bridge wing on both sides.

(2) MRO/ Signal office (includes a locker with a combination safe for storing classified communication documents).

(3) Combat Information Centre (CIC)/ Ops Room.

(4) Ship's Office.

(5) Ventilation and air conditioning room/space.

(6) Steering gear compartment.

(7) Main and auxiliary machinery compartments.

(8) Machinery Control Room.

(9) Cold room and Cool room.

(10) Diving equipment compartment.

(11) Magazine room/rooms.

(12) Ship's Canteen.

(13) Magazine room, along with a separate small arms locker/ rack.

(14) Any other requirements for the ship’s operation are to be incorporated.

d. **Stores and Lockers**. The following are to be provided if not otherwise mentioned in different parts of this document:

(1) Pyrotechnic locker.

(2) Dry Provisions and Condiments Store.

(3) Fresh and Vegetable lockers.

(4) Rope and rigging locker.

(5) Paint store.

(6) Anchor chain/cable locker.

(7) Marine engineering store.

(8) Gunnery store.

(9) Electrical store.

(10) Fore peak tank/store.

(11) Sufficient number of ready-use ammunition lockers.

(12) Small arms locker.

(13) Mess gear locker

(14) Cleaning gear locker.

(15) 10 x Breathing Apparatus lockers.

(16) Medical kit locker.

(17) Flag Lockers.

(18) Spare parts locker (Engineering, Electrical, and Electronics).

(19) Crockery lockers (Galley, Ward Room, Senior Rates pantry, Junior Rates dining).

(20) Navigation Equipment locker (preferably at the bridge).

(21) Lockers for storing official documents at all working spaces (minimum 12).

(22) Lockers for storing all supplied life jackets.

(23) Naval standard pistol cupboard with lighting arrangements.

(24) FRP post and locker.

(25) Any other requirements for the ship’s operation are to be incorporated.

e. **Tanks**. Tanks for fuel oil, lube oil, fresh water, dirty lube oil, etc.,are to be provided as necessary. Most of the tanks are to be constructed as an integral part of the hull. Each tank is to be fitted with filling and discharge lines and valves, gauges, vents, etc.

f. **Capacity of Stores and Tanks**. Store and tank capacities are to be commensurate with the requirements of complement and endurance. Usable water tank capacity should be at least40,000 liters. The stores are to be fitted with shelves, racks, bins, and other facilities as required.

0405. **Divisions and Subdivisions of the Main Hull**. The main hull is to be divided and subdivided by the required number of watertight bulkheads, with consideration given to the hull's structural strength, the ship's damaged stability, personnel and material movement, and the installation and removal of machinery and equipment.

0406. **Structural Design of Hull and Superstructure**.

a. **Hull**. The hull's structural design complies with the class requirements. However, a combination of transverse and longitudinal framing systems is to be adopted to enable the ship to withstand heavy impact forces. The longitudinal structural elements are to consist of the plating of the bottom, sides, and main-deck, the central keelson, bottom side girders, side stringers, main-deck girders, main-deck longitudinal, bottom longitudinal, etc. The transverse main structure consists of an appropriate number of watertight bulkheads and strong web-frames supporting the longitudinal elements. Structural details of the following are to be submitted before the beginning of the construction of the LPCs:

(1) Frame spacing.

(2) Bottom structure.

(3) Side structure.

(4) Main Deck structure

(5) Stem structure.

(6) Stern structure.

(7) Bulkhead Structure.

(8) Liquid Tank structure.

(9) Main and Auxiliary Machinery Seating.

(10) Engine Room Hatches.

b. **Superstructure**. The structural design of the superstructure is to be in accordance with the requirements of the class.

c. **Design Considerations**. In designing the framing system for both the hull and the superstructure, consideration is to be given to proper drainage of water and ballast, as well as accessibility. Steel/Aluminum works are not to be boxed in pockets that collect water.

0407. **Hull Materials**. The main hull is to be constructed from AH36/ AH 40 high-tensile mild steel plate or a higher grade, certified by the classification society. The superstructure is to be of corrosion-resistant shipbuilding quality, marine-grade Aluminum alloy of the class grade. Appropriate welding material and techniques approved by the classification society are to be used.

0408. **Scantlings**.

a. The scantlings of the structural members are to be as per the requirements of the classification society's standard.

b. The minimum scantlings/thickness/spacing of the following places are to be mentioned in the quotation:

(1) Side and bottom plating.

(2) Deck plating.

(3) Sheer strake.

(4) Bulkhead's plating.

(5) Shell plating.

(6) Transom plating.

(7) Tank.

(8) Side longitudinal.

(9) Deck longitudinal.

(10) Web frames.

(11) Deck girders.

(12) Keel bar.

(13) Superstructure plating.

(14) Frame spacing.

0409. **Frames**. The frames are to be of one piece from keel to gunwale, except where tanks are in the way. All beams, girders, stringers etc. are to be as per the classification society's requirements.

0410. **Side Longitudinal**. The side longitudinal is to be of one piece as far as possible. All beams, girders, stringers, etc., are to be as per the requirements of an internationally recognized classification society.

0411. **Deck Longitudinal**. The deck longitudinal is to be of one piece as far as possible. All beams, girders, stringers etc. are to be as per the Classification Society's requirements.

0412. **Bulkheads**. The bulkheads are to be watertight and all welded to the requirements of the classification society.

0413. **Bulkhead Stiffeners**. These are to comply with the classification society's requirements.

0414. **Main and Auxiliary Machinery Seating**. These are to be as per the requirements of the Classification Society or the manufacturer of the concerned machine and equipment.

0415. **Engine Room Hatches**. If the ship's design permits, the Engine Room and Superstructure Hatches are to be watertight, flush-bolted, for the removal of main engines and other heavy machinery and equipment. For the removal of auxiliaries of a size equal to or below the generator, requiring overhaul/maintenance, flush-type bolted patches may be installed on the main deck. The patches are to be made of steel/ aluminum alloy and secured with bolts and proper slings.

0416. **Anchor Chain/Cable Locker**. A self-stowing chain locker of sufficient capacity is to be arranged to stow the cables well clear of the deck. The locker must be watertight.

0417. **Sea Chests/ Sea Inlets**. Required numbers of sea chests (in primary 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-mounted to the bottom. Each sea chest is to be supplied with a vent hole at the topside and a drain hole at the bottom.

0418. **Hawse Pipe**.

a. The hawse pipes of adequate diameter and length are to 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 pipes are to be protected with round bars or castings of good quality.

b. The anchor is to be stowed in recessed pockets in the shell.

c. Washing outfitting is to be provided in the hawse pipe.

0419. **Construction of Tanks**. The fuel oil, lube oil, fresh water, dirty lube oil, sewage tank, etc., are to be an integral part of the hull, to the extent possible, and are to be constructed and tested in accordance with the classification society's regulations.

0420. **Superstructure**.

a. The superstructure, including its closed bridge, is to be constructed by marine-grade aluminum alloy, certified by BV/LR (Member of IACS). The superstructure is to be of welded construction, with strong, standard, high-quality bimetallic joints welded to the deck. As the superstructure is to be of aluminum alloy, the bulkheads of the superstructure should also be of the same material.

b. Superstructure is to be transversely stiffened, and the inside of division bulkheads is to be of flat type or wedge type, vertically stiffened where suitable.

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

0421. **Foundation for Armaments**.

a. **ASW LPC**.

(1) All gun and torpedo launcher foundations are to be designed to withstand the thrust on the deck to avoid distortion of the structure and the armament/equipment.

(2) Gun and torpedo launcher's foundations and supporting structures are to be stiffened to prevent misalignment, which would interfere with the operation of the weapon/equipment, and to preclude excessive vibration on the foundation.

(3) Machining and alignment of the gun and torpedo launcher foundations are to be carried out in accordance with the manufacturer's requirements.

(4) Gun and torpedo launchers are to be placed to have a maximum firing arc.

b. **ASuW LPC**.

(1) All gun and SSM launcher foundations will be made to withstand the thrust on the deck to avoid distortion of the structure and the armament /equipment.

(2) Gun and SSM launcher's foundations and supporting structures are to be stiffened to prevent misalignment, which would interfere with the operation of the weapon/equipment, and to preclude excessive vibration on the foundation.

(3) Machining and alignment of the gun and SSM launcher foundations are to be carried out in accordance with the manufacturer's requirements.

(4) Gun is to be placed to have a maximum firing arc.

0422. **Magazine**. Magazine room for the stowage of ammunition for guns is to be made. In the design of an ammunition storage system, full consideration will be given to safety, strength, rapidity of handling, weight saving, economy of space, and elimination of features that may damage the ammunition. The arrangement is to ensure that the ammunition remains safe when the ship is inclined at 30° while rolling. Portable vertical and horizontal battens are to be fitted with the devices to secure them in their position. All ammunition in stowage is to be safe in normal ship operation conditions. Special fireproof shielded cables and explosion-proof lights and fittings are to be fitted inside the magazine. It is to have a flooding and sprinkler system for firefighting in the magazine. The recommended fire-retardant paint scheme is to be applied. Details of the magazine are given in section XI.

0423. **Small Arms Stowage**. Small-arms lockers and magazines equipped with suitable stowing facilities, with accessories and ammunition, are to be made as convenient as possible.

0424. **Primary Surface Preparation and Shop Priming**. Steel plates and sections are to be cleaned and cleared of military scale by blast cleaning and coated with a primer before fabrication. The shop primer shall not be harmful to the welding work and shall be compatible with the subsequent coatings.

0425. **Painting**.

a. Epoxy coating of International Paint/SIGMA/JOTUN / HEMPEL should be applied in the underwater area. Suitable Epoxy/ Conventional paint is to be used in other areas, as acceptable to BN. Before the application of any paint scheme, appropriate surface preparation, along with painting temperature, is to be as per the classification society's rules. Details are to be mentioned.

b. The paint scheme and dry film thickness are to be as per the recommendation of the paint manufacturer for a new building ship.

c. Detail paint schedule for different areas of the LPC is to be submitted with the tender quotation.

d. Fuel oil, lube oil tanks, and bilge areas are to be painted with an appropriate conventional paint scheme.

e. Fresh water tanks are to be painted with internationally recognized paint manufacturers' recommended paint scheme. A certificate from the paint manufacturer must be provided stating that the dissolved paint will not pose a health hazard.

f. Non-skid paint is to be applied at the weather decks (walkway).

g. Epoxy primer, anti-corrosive (minimum two coats) and anti-fouling (minimum two coats) paint are to be applied for the outside of the main hull under the waterline and appendage.

h. Conventional anti-corrosive primer and finish paint are to be applied on the outside surface of the main hull above waterline, on the decks, and on the inside and outside surfaces of the deckhouses.

j. Black anti-corrosive paint is to be applied for anchor equipment. A conventional anti-corrosive primer and black finish paint are to be used on towing and mooring equipment.

k. Magazine is to have non-flammable insulation and be painted internally with non-flammable paint.

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

m. Colour of external and internal painting of the ship's hull and structure will be decided by BN.

0426. **Cathodic Protection**. Adequate numbers of zinc anodes, as per class standard, are to be fitted to protect the underwater hull and fittings. The zinc anode plan is to be provided at the time of delivery of the LPCs.

0427. **Insulation and Deck Coverings**.

a. **General**. Living and control spaces are to be fitted with thermal insulation as appropriate. The exposed side of insulation is to be finished with appropriate insulating material, where not covered by joiner lining or ceiling panel, in living and control spaces. But the concealed space by sheathing is to be finished with aluminum foil. The insulation material must be appropriate.

b. **Insulation**. Details of insulation for deck/wall, beam/girder/stiffener, external deck bulkheads, galley, ceiling, and bulkheads (in bridge, Ops room, wardroom, accommodations, messes, bathrooms, and magazine) are to be provided. Machinery spaces are to be insulated only above the waterline.

c. **Face Plate/Lining**. The bulkheads and ceilings of the bridge, ops room, living spaces, messes, offices, and lavatories are to be laid with plastic-coated marine-grade wood/panel boards in a light decorative colour approved by BN.

d. **Deck Coverings**.

(1) Within galley, wash places, toilets, and other wet accommodation spaces, deck coverings are to be of non-slip marine-type epoxy resin.

(2) In other accommodation spaces, offices, lobby, etc., deck coverings are to consist of suitable underlay covered with marine-type PVC tiles. (UK, USA, EU countries)

0428. **Signature**. All signatures should be a minimum. Sharp-bended (right-angled) superstructure/high-temperature object on the upper deck should be avoided. The shafting and propellers are to be designed for low noise. All heavy vibrating machinery should be mounted on special noise-absorbing mounts.

0429. **Hull Designation and Markings**.

a. **Location and Access Colour Marking**. All compartments, doors, hatches, manholes, and scuttles are to be marked/numbered and colour coded in accordance with the British Navy's BR 2170 (RN) system as practiced in BN.

b. **Draft Marks**. Draft marks are to be placed at a suitable place at both sides of the bow, both sides of the quarter deck/ stern. In addition, highest underwater projection (Propeller, SONAR Dome, etc.) shall be marked as projected draft.

c. **Ship's Number and Distinguishing Marks**. The ship's number and distinguishing marks are to be provided. The name box in Bangla and English is also to be provided.

d. **Builder's Data Plaque**. Two bronze/copper plaques, in English and Bangla, cast or engraved, are to be supplied.

e. **Benchmarks**. The ship's structure is to be scored with suitable trim and benchmarks to aid in the accurate alignment of the gyrocompass, armament, etc., and the same are to be recorded. The position of the rudder amidships is to be permanently marked on the structure.

f. **NBCD Marking**. All NBCD markings (Risk, Control, and Location marking) are to be marked in designated places as per the British Navy's BR 2170 (RN) system, as practiced in BN.

g. **Warning, Operating and Instruction Plates**. In addition to the plate required by the applicable specifications, warning plates (such as various safety warnings), operating and instruction plates, etc., are to be installed as needed. Self-illuminating "Exit" markings are to be provided inside all compartments/machinery spaces. Various display and information boards are to be provided in the lobby and different working areas as required.

SECTION – V

DECK AUXILIARY AND ACCOMMODATION OUTFIT

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

0502. **Watertight Doors**.

a. Watertight aluminous doors secured with wedge clips and a handle for working them on both sides of the bulkhead are to be fitted to all external accesses. Watertight steel doors, or watertight steel fireproof doors, are to be installed in the watertight bulkhead of the main hull. The doors within the superstructure will be of aluminum in accordance with class requirements.

b. The doors are to be provided with seals, gaskets, and clamping devices approved by the classification society. These are to be permanently attached to the bulkhead or to the doors, and the doors are to be operable from both sides of the bulkheads.

c. Hooks, clips, or catchers are to be fitted for fixing the door when open. The steel hinges are to have naval brass pins and a grease nipple for lubrication.

d. Doors to store rooms and similar compartments are to have their hinges with hinge pins clenched.

e. Quality marine-type padlocks are to be provided where necessary.

f. Clear height of doors from deck covering, numbers of clips, depth of seals in different doors, etc., are to be in accordance with class requirements.

0503. **Miscellaneous Non-Watertight Doors.**

a. Access to all offices and accommodations, etc. is to be by hinged non-structural doors.

b. The doors are generally arranged to open into the spaces they serve, in accordance with the class requirements. Ventilation louvers are to be fitted in the doors of all toilets.

c. Ventilator openings, on the lower half of the doors, as per standard practice, are to be provided.

d. Joiner doors are to be without coaming except where the doors are located in structural bulkheads or in bulkheads bounding wet spaces.

e. Door closure and other fittings are to be fitted only on joiner doors to all air-conditioned spaces.

0504. **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 are 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 generally not occupied are to be fitted with butterfly nuts and hanged clips.

d. Hatches required for escape purposes are to be fitted with wedges and clips, worked by handles both above and below the hatch.

0505. **Maintenance Holes and Covers.**

a. Manholes and covers of steel are to be fitted to give access to tanks, watertight compartments, and similar inaccessible spaces. They are to have water-tight, gas-tight, and oil-tight covers as necessary with test plugs.

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 to covers, giving the name of the compartments to which they give access.

0506. **Bolted Patches**. If design permits, for the removal of machinery parts requiring overhaul/ maintenance, flush-type bolted patches are to be installed on the main deck. The patches are to be made of steel and secured with bolts with proper slings.

0507. **Windows**.

a. All windows are to be made of anodized aluminum alloy frames with heat-treated safety glass. These may be of fixed or opening-hinged type.

b. Two sets of clear-view screens are to be fitted with the front window of the bridge.

c. Marine standard wiper and fresh water spray (pipe connected to domestic fresh water line) is to be provided for the front window of the bridge for washing the window.

0508. **Side Scuttles and Portholes**. For stealthy performance of whole ship, on side scuttles and portholes will be arranged for cabines, except for the wheelhouse.

a. Side scuttles in wheelhouse are to be delivered with welding-type steel coaming and brass glass frame with steel-hinged dead light cover.

b. All operable type portholes are to be made of hard glass in brass or SS frames.

c. Water collector is to be fitted with each porthole.

0509. **Plan for Doors, Windows And Openings**. A plan for doors, windows, port lights, deck openings, etc., is to be submitted in a detailed design.

0510. **Ladders**.

a. Suitable inclined ladders (accommodation ladders for the central passageway) and vertical ladders (will be fixed on the hinge side of the deck hatch) are to be installed as required.

b. All footsteps of inclined ladders should be of a rectangular flat shape with non-skid rubber for slip resistance.

c. Accommodation and deck houses are to be provided with climbing steps and a hand grip.

d. Two sets of portable pilot rope ladders are to be provided and arranged adjacent to the lifeboat and Rigid Hull Inflatable Boat (RHIB) with fittings and securing arrangement of the deck.

0511. **Bulwark, Rails, And Stanchions**. The LPCs are to be fitted with steel/gunmetal bulwarks in Fox'l, as required, on both sides of the Forepeak for protection against rough seas and adverse weather. Aluminum hand rails, guard rails, storm rails, and stanchions are to be provided around the open decks and the deck house where necessary. Guard rails are to be removable type on the main (weather) deck.

0512. **Floor Plates and Gratings**. In machinery spaces and stores, non-skid aluminum floor plates are to be provided. Gratings are to be installed for easy maintenance.

0513. **Mast**. A fabricated aluminum alloy mast, strong enough to carry Electro-Optic Tracker, search and navigational radar, and communication equipment, flags, etc. Necessary blocks, yardarm, hooks, fittings, etc. are to be incorporated in the mast. The deck structure is to be sufficiently stiffened to bear the load and vibration of the mast during the rough sea conditions. A suitable ladder is to be placed alongside the main mast to facilitate maintenance of the RADAR antenna, communication equipment, and flags fitted at the top of the mast.

0514. **Jack Staff and Ensign Staff**. Collapsible jack staff and ensign staff of steel pipe with necessary fittings are to be provided at the bow and stern, respectively. Each staff member is to be fitted with hooks for rigging dressing lines.

0515. **Navigation Light Boxes**. Two steel/aluminum sidelight boxes, welded to the compass/ wheelhouse deck/ bridge wing, are to be provided to house the port and starboard navigation lights. In addition, appropriate flashing lights and search lights are also to be fitted on the bridge top for night navigation.

0516. **Air Inlet Gratings**. The engine room, ventilation air inlet gratings (draining type), and outlet gratings are to be installed.

0517. **Air Dust Covers**. Arrangement for closing the inlet and outlet gratings for ventilation of the engine room is to be made with watertight aluminous covers.

0518. **Bollards**.

a. Appropriate number of double-head type bollards is to be fitted on the fore and aft deck on either side. It is to be of welded construction with steel pipe or plate. Number and position of bollards and fairleads are to be made as per the requirements of BN (considering the tidal range and berthing arrangement of naval berths).

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

0519. **Fairlead**. An adequate number of suitable fairleads are to be provided. The fore and aft fairleads will be suitable for receiving the mooring lines and the towing ropes.

0520. **Cleats and Eyebolts**. A 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 are to be fitted in the appropriate location.

0521. **Towing Bit**. Suitable towing bits and bollards are to be fitted on the forepeak and aft deck.

0522. **Towing Rope**. One polyamide-towing Hawser per LPC, with a diameter of 203.2 mm and a length of 220 m, is to be provided with the necessary fittings for towing and being towed.

0523. **Mooring/Berthing Hawsers.** The following are to be supplied for each LPC:

a. 12 x berthing hawser per LPC (size 152.4 mm x 110 m)are to be provided.

b. 1 (one) polyamide mooring/ berthing rope (Circumference 100 mm x Length 110 m) per LPC is to be provided.

c. 20 (twenty) heaving lines per LPC are to be provided.

0524. **Reels**. 1 (one) marine standard reel per LPC for securing berthing hawsers, towing rope, spring hawser, shore supply electric cables, etc., is to be provided.

0525. **Riggings**. Sufficient halyards in the main mast have to be catered for hoisting various flags and ensigns (such as naval ensign, signal flags, commissioning pendant, battle ensign, board pendant, etc.) for each LPC.

0526. **Canvas**. The following are to be supplied for each LPC:

a. 2 (two) sets of portable awnings (one for regular use and the other for ceremony) are to be provided as required for spaces at forward, main top/ gun deck, and aft main deck.

b. Equipment, armaments, and sensors requiring protection on the weather decks are to be provided with waterproof canvas covers.

0527. **Shore Gangway and Brow**. One in number aluminum alloy shore gangway and Brow of suitable size fitted with handrails on sides, stanchions, wheels, lighting arrangements, etc., is to be provided for each LPC. The ladder is to have a shore roller with a neoprene tire at the shore and a hook at the other end.

0528. **Locks, Keys, And Tags**. All doors, hatches, etc., are to be provided with locking arrangements (padlocks or rim locks), along with key rings and identification tags for each LPC. Mortise-type cylinder locks are to be fitted to joiner doors. All compartments, machinery, and equipment are to be marked with stainless steel or brass nameplates/tags. All do's and don'ts of operating instructions, safety instructions/warnings related to machinery and equipment operation onboard, are to be engraved on stainless steel /brass plates and hung/pasted on appropriate locations/compartments.

0529. **Keyboards**. One 'Armament Keyboard and one 'Important Keyboard' are to be fitted in the Captain's cabin and Ward room, respectively. A 'General Keyboard' will be fitted in the lobby near the wardroom. All key boards will have glass fronts with wire mesh, key hooks, and identification tags. A similar, smaller keyboard will be provided in various workspaces as required.

0530. **Safety Appliances**. LPCs must be provided with standard life-saving appliances in accordance with the SOLAS Convention. In this regard, a classification society must issue certificates in accordance with SOLAS class requirements. The following are to be supplied for each LPC:

a. **Ship's Boat**. The ship's (organic) boat should be rigid-hull inflatable or composite-hull vessels approximately 6.5 meters in length and 2.5 to 2.8m breadth, capable of rapid launch and recovery in sea states up to 3 (wave height 3-4 feet), and compatible with an onboard electro-hydraulic deck crane for hoisting/lowering. The boat must support high-speed propulsion (Min 30 knots), carry a minimum of 10 personnel, and be equipped for boarding operations, search and rescue (SAR), surveillance, and force protection. Mission-specific features should include secure communications (VHF/UHF), independent navigation systems, towing points, EO/IR sensors, and optional light weapon mounts. Supplier has to facilitate the integration with the mother ship for reliable refueling, modular maintenance, and stowage for boarding kits, medical gear, and survival equipment. It should also include shock-mitigating seats, ballistic protection, and night vision systems. The boat must be resilient in tropical and littoral environments, with corrosion-resistant fittings. Details as mentioned in Annex F.

b. **Life Rafts.** 4 x 25 men capacity inflatable life rafts with cradle, holding straps, hydrostatic release valves, and other accessories will be supplied. Life rafts are to meet the class requirement.

c. **Life Buoys, Life Jackets, and Smoke Signals.** Sufficient numbers of life buoys, life jackets, survival suits, signals, first aid kits, etc., are to be provided in accordance with class requirements.

d. **First Aid.** 6 (Six) first aid kits, along with one stretcher, etc., are to be provided.

0531. **Firefighting and Detection**. The following are to be provided for each LPC:

a. **Fixed Firefighting System for Engine rooms**. The engine rooms are to be provided with a standard fixed firefighting system that can be operated from the engine room entrances. Agent, Testing facility, number of bottles, and their capacity are to be specified.

b. **Fire Central System**. A pressurized seawater fire main system with a sufficient number of fire hydrants is to be laid in the LPC, with two dedicated fire pumps (to be used alternately) attached to hydrants throughout the ship. The fire main pressure and the actual number and location of fire hydrants are to be specified.

c. **Fire Hose and Nozzles**. Every fire hydrant is to be provided with an adequate length of marine-standard fire hose with end couplings and a combined spray-jet nozzle, stored in boxes at a nearby suitable place.

d. **Portable Fire Extinguishers**. The required number of portable fire extinguishers and refills for solid, liquid, and electrical fires must be provided and placed throughout the ship as per class requirements. The details of the extinguishers are to be specified.

e. **Breathing Apparatus**. 10 x breathing apparatus (BA) with spare bottle and extension harness are to be supplied.10 (ten) Extended Duration Breathing Apparatus (EDBA) with spare bottles, BA boards, and extension harnesses are to be provided and placed in suitable locations throughout the ship.

f. **Fear naught Suit**. 10x Fear naught suits for firefighters are to be supplied. The brand and type of the Fear naught suit are to be specified in the quotation.

g. **IR Gun.** 2 X IR Guns for remote temperature sensing are to be supplied.

h. **Portable Firefighting Pump**.

(1) Minimum 02 X Portable diesel firefighting pump of adequate capacity with accessories is to be supplied.

(2) Minimum 02 X Portable submersible pumps with different capacities (varying from 10 to 30 tons) are to be supplied.

j. **Foam Making Branch Pipe and Foam Gun**. Four portable foam-making branch pipes and foam guns, along with foam tanks and rubber hoses of required lengths, with accessories, are to be supplied. All supplied foam-making branch pipe, foam gun, foam tanks, and rubber hoses, along with accessories, are to be marine standard and certified by the class.

k. **Flooding and Sprinkler System**. Flooding and a sprinkler system are to be provided for each magazine/ammunition store. All supplied flooding and sprinkler systems will be marine-standard and certified by the class.

l. **Emergency Life Saving Apparatus (ELSA)**. 30 (thirty) in number, ELSA will be provided.

0532. **Fire, Heat& Smoke Detector**. One suitable marine-type fire, heat, and smoke detection system is to be fitted onboard each LPC as approved by the class. All working spaces, accommodation, and machinery compartments are to have appropriate fire, heat, and smoke sensors. The system monitor is to be located at the bridge and any suitable place. Details of the fire, heat, and smoke detection system sensors and wiring diagram are to be specified.

0533. **Following Damage Control Equipment**. Damage Control equipment/ items are to be supplied, in accordance with the class requirement for each LPC:

a. 2 (two) Fixed electrically operated Fire Pumps are to be provided. In addition, it will be used as a Fire pump. These pumps are to run as General Service (GS) pumps and are to be used for the fire main system and for bilge cleaning. Following pumps are to be provided for emergency fire and damage control.

(1) 2 (two) in number Portable Emergency Diesel Fire Pump are to be provided. Details are to be specified.

(2) 2 (two) in number Portable Submersible Pumps with all standard accessories. Details are to be specified.

b. 2 (two) sets of Damage control equipment, including NATO Shoring Bar, Adjustable Tubular Stay, Splinter Boxes, Stopper Plates, Wooden Bars, Wooden Planks, Wooden Wedges, Wooden Plugs, Hammers, Mallets, Hand Saw, Flood Protection Kit, Pipe Spanner, etc., along with other required tools and materials.

c. 6 (six) in numbers marine-type portable emergency lamps.

d. 1 (one) in number Thermal Imaging Camera (TIC) for firefighting. Details are to be specified.

0534. **Diving Equipment Room/ Store**. Air-conditioned stowage and charging facilities are to be provided in a suitable location for 8diving sets, with the necessary gear, and a portable diesel/electric air compressor suitable for supplying diving air. The diving store should have provisions for charging the diving sets with safe compressed air supplied from the compressor. Diving sets and gears, including the compressor, are to be supplied as per the BN standard.

0535. **Flag and Navigation Shape Locker**. 2 (two) in number watertight flag lockers with a total of 70 pigeonholes and 1(one) in number Navigation Shape locker of suitable size are to be fabricated and fitted on the upper deck near the mast of each LPC.

0536. **Miscellaneous**. The following items are to be supplied for each LPC:

a. 2 (two) in number aluminum three-tier steps are to be provided for use at the end of the gangway ladder during high/low water when the ship is alongside the jetty.

b. At least two wooden plungers and one Bosn chair for painting the shipside and the mast.

c. Gangway table with a suitable wooden/ Perspex state board will be provided as per the BN standard.

d. Ropes for halyard, heaving line, boat fall, etc., of various sizes and lengths.

e. 2 (two) in number boat hooks (with securing arrangement at main deck).

f. 1 (one) in number gangway buoy stand.

g. 1 (one) in number, the officer’s state board.

h. Watch and station bill in the lobby.

j. Deck tackles (with arrangements) for hoisting anchors manually.

k. One in a number bottom chain.

l. Emergency cutting gears (such as an axe in forecastle and after deck).

m. One digital camera with optical zooming facility.

n. 1 (one) in number gunmetal ship's bell.

0537. **Deck Machinery**. Deck machinery is to be classified by the classification society (IACS), with certificates issued for steering gears, anchor capstans, and deck cranes.

0538. **Steering Gears**.

a. One electro-hydraulic steering gear system of western origin and manufactured(USA, UK, EU Countries, Switzerland, Norway) of appropriate capacity and design according to the classification society's (IACS) requirement for double-plated twin rudders is to be installed in the steering gear room for each LPC. Primary steering is to be from the bridge, with a secondary steering position located in the steering gear room. The steering system is to be operated with the ship's main power supply. The specification of the steering system must be detailed. The system will have at least 02(two) steering pumps of appropriate capacity for redundancy. The system is to be reliable, durable and complete in all respects for trouble free operation.

b. Appropriate steering wheel, a joystick for electrical operation and an autopilot should be situated (preferably at the ship's center line) in the bridge.

c. Rudder angle indicators are to be installed in the Bridge, MCR and Steering Gear room of each LPC.

d. **Emergency Steering Gear**. Necessary arrangements with the hand pump are to be fitted for emergency steering in case of system failure.

0539. **Anchor and Chain Cable**. 2 (two) stockless anchors of adequate size, with necessary chain cables and other accessories, including a chain compressor and a strong back, are to be provided. The installation of anchors and cables must meet the class requirements. Details about the anchors and chain cables (including length) are to be provided.

0540. **Capstan**. 01 (one) in number electrical vertical capstan of adequate capacity is to be installed on the forecastle deck for handling chain cables/mooring ropes as per the classification society's standard. The capstans are to be operated with the ship's main power supply. Details of capstans (including working load, power output, and braking system) are to be mentioned.

0541. **RAS Gears**. The LPC should have facilities and posts for underway RAS. Standard RAS gears (with accessories) are to be provided as per Annex K.

0542. **Deck Crane**. 1 (one) electro-hydraulic deck crane to lower and hoist the boat is to be provided and installed for handling the ship's boat, stores, etc., for each LPC. The boat will preferably be lowered from both sides of the ship. The necessary gear and accessories for hoisting and lowering the boat will also be provided. The operating console will be located in a convenient place for boat operation. The details of the crane are to be mentioned.

0543. **Furniture**. The furniture and facilities in the accommodation, living spaces, and working places are to bead equate for the number of personnel and of good marine quality, as the design provided by the foreign shipbuilder. The furniture materials are to be made of high-quality teak or mahogany. Metallic furniture may also be used.

0544. **Onboard Arrangements.** Following onboard arrangements for each LPC are to be provided:

Space	Allocated Person	Description	Remarks
CO's cabin	1	1 (one) Single tier bed with drawer and bedding items, 1 (one) Smart LED TV version with appropriate size commensurate with the cabin size (Sony Bravia), internet connection,1 (one) combination safe, desk, revolving chair, easy chair, table, wardrobe, book rack, mirror, filing cabinet, sofa with arm	1 x lavatory (toilet, wash basin, and shower) with standard fittings.

		rest, 1 (one) armament key board, 1 (one) important key board, hat and coat hook, clock, ash tray, waste basket, shoe rack etc.	
Officers cabin	8	1 (one) x single 2 tier cabin and 2 (two) x double2 tier cabins with drawer and bedding items, desk, arm chair, wardrobe, book rack, mirror, filing cabinet, hat and coat hook, shoe rack, clock, ash tray, waste basket, internet connection, etc. one cabin (SO's cabin) is to have one combination safe of suitable size.	1 x common lavatory (includes 2x toilet cubicles. 1 x urinals, 2 x shower cabinets, 2 x wash basins and 1x washing machine) with standard fittings.
Ward Room	9	One wardroom with sufficient space for dining table, 1 x 3-seater sofa, five dining chairs, 1 (one) DVD with rack, 1 (one) Smart LED TV latest version with appropriate size commensurate with the cabin (Sony Bravia), Multimedia projector with a laptop (processor Corei7 or higher), internet connection, 1 (one) arm chair, hat hook board, serving hatch, book/ magazine shelf/ rack, clock, ash tray, waste basket, first aid box. Important keyboard, pistol cupboard. Crockery locker, information board, etc.	1x small pantry
Sailors' Accommodation	66	a. 2 messes, each mess to accommodate a minimum of 10 people, with drawers and bedding items, table, armless chairs, wardrobe, book rack, mirror, hat and coat hook, shoe rack, clock, waste basket, etc. b. 2/ 3 messes, each mess to accommodate a sufficient number totaling a minimum maximum 48 persons with drawer and bedding items, tables, benches, kit locker, book racks, mirrors, ashtray, hat and coat hooks, shoe racks, waste basket etc.	1 x common lavatory for senior ratings (includes 2 toilet cubicles, 2 urinals, 2 wash basins, 2 shower cabinets, 1 washing machine) with standard fittings. 2 x common lavatory for junior ratings (each includes 3 toilet cubicles, 3 urinals, 3 wash basins, 3 shower cabinets, 1 washing machine) with standard fittings
Senior Rates	18	Standard dining facility with 1	With a separate

Dining		(one) Smart LED, the latest version with an appropriate size to commensurate with the room (Sony Bravia), chairs, tables, wash basins, and a suitable crockery locker.	pantry.
Junior Rates Dining	48	Standard dining facility with benches, tables, wash basins, suitable crockery lockers and drinking water supply facility from the water purifier mentioned in article 0546.	With a suitable serving facility from the ship's galley.
Bridge	-	1 (one) chart table with dimmer light (red) and curtain, 1radio table (with a chair and red dimmer light), 1 (one) captain's chair with arms, 1 (one)helmsman seat, 1 (one) Engine operator's seat, 1 (one) clock, 1 (one) navigational equipment locker, file/book cabinet (2-drawer), inclinometer, book rack, first aid box etc.	-
Gangway	-	1 (one) gangway table, 1 (one) officer's state board, 1 (one) lifebuoy with stand, 1 (one) hygrometer in a box, 1 (one) barometer, and a wall clock, 1 (one) QM Hut	Includes one post each for the shore telephone and the general broadcast
Lobby	-	1 (one) Notice board, 1 (one) General keyboard, 2 (two) watches and station billboard, 2 (two) display boards and 2 (two) first aid boxes.	-
Fox'l and Q/Deck	-	a. 1 (one) CCTV camera with IR in the Fox'l and 1 (one) CCTV camera with IR in the Q/Deck for all-around view of the forward and aft part of the ship with a central monitoring system at the bridge. b. The Central Monitoring System may explicitly include a Network Video Recorder (NVR) as a core component of the CCTV system for retention of data. c. An additional Pan-Tilt-Zoom (PTZ) camera may be installed on the aft mast to provide a comprehensive 360-degree Field of View (FOV)	

0545. **Furniture for Exposed Deck and Other Spaces**. The following furniture is to be provided on the exposed deck:

a. 3 (three) Aluminum watertight life jacket boxes.

b. 1 (one) Wooden thermometer box.

c. 4 (four) First aid boxes.

d. 2 (two) Stretchers with securing arrangement.

e. 8 x standard chairs.

f. Shelves, cupboards etc. for galley.

g. Shelves, cupboards etc. for wardroom pantry.

0546. **Fittings of Sanitary Spaces**. All exposed metal fixtures; taps, valves, accessories etc. are to be of chromium-coated brass. Rubber washers are to be fitted between all plumbing fixtures and metal supports.

a. **Wash Basin**. Marine-type stainless steel washbasins with a spring-loaded tap are to be provided. The S-trap and rubber ring are to be provided. The details are to be mentioned.

b. **Water Closet**. Marine-type water closets (High Commode) are to be of pedestal type for officers and Asian type for crew. The material for the closets is to be vitreous, with hard-plastic seats and lids. A vacuum-flushing system for a high commode and one freshwater tap are to be provided.

c. **Shower and Water Tap**. Marine-type showers are to be of swivel-shoe head type. The showers and water taps in each bathroom and toilet should be marine-grade. The captain's and officers' bathrooms are to have hot water.

d. **Toilet Cabinet**. The toilet cabinet is to be made of molded plastic, with a shelf inside and a mirror on the hinged door. The mirror lamp is to be fitted over the toilet cabinet.

e. **Others**. 2 (two) washing machines, including a wall-mounted lavatory rack and mirror with the washbasins, soap holder, towel rack, hooks, toilet paper holder, seawater tape, etc. are to be provided as necessary. The details of the washing machine are to be mentioned.

0547. **Galley**. The galley should have a facility to cook for a minimum of 80 persons, and adequate supply and exhaust blowers should be fitted to ensure good ventilation. The following equipment and furniture are to be provided:

a. 2 (two) Electric cooking ranges, each with 2 hot plates and electric chimneys over the cooking ranges. Both the equipment should be able to run by the ship's generator supply and shore electric supply.

b. 1 (one) Steam rice cooker (should be able to run by ship's generator supply and shore electric supply).

c. 1 (one) Stainless steel sink (2 x bowls).

d. 1 (one) Stainless steel working table.

e. 1 (one) Chopping table.

f. 1 (one) Exhaust fan.

g. 1 (one) Supply fan.

h. 1 (one) Deep Fridge (minimum 380 liters)

j. 1 (one) Microwave oven.

k. 1 (one) Blender.

l. Marine type Fresh and seawater tapes as required.

m. 1 (one) Water purifier (UV filter with RO, capacity minimum 20 liters/hour) fitted with a fresh water line with a minimum 40 liters storage facility.

n. 1 (one) Electrical Kettle.

p. 1 (one) Egg bitter (electric).

0548. **Ward Room Pantry**. The following are to be provided in the Ward Room pantry.

a. 1 (one) Refrigerator (minimum 280 liters).

b. 1 (one) Microwave oven (minimum 12 liters).

d. 1 (one) Blender.

e. 1 (one) Bread toaster.

f. 1 (one) Stainless steel sink (1 bowl).

g. 1 (one) Water purifier (UV filter with RO, capacity minimum 10 liters/hour) fitted with a fresh water line with a minimum 20-liter storage facility.

h. 1 x Sandwich maker.

j. 1 (one) Electric Kettle.

k. 1 x Coffee Maker.

0549. **Senior Rates' Pantry**. The following are to be provided in the Senior Rates pantry:

a. 1 x Refrigerator (minimum 280 liters).

b. 1 x Microwave oven (about 12 liters).

c. 1X Bread toaster.

d. 1 X Stainless steel sink (1 bowl).

e. 1 (one) Electric Kettle.

0550. **Mess Traps, Mess Utensils and Galley Implements**. Mess Traps, mess utensils and galley implements are to be supplied for Wardroom, Senior Rates' mess, Junior Rates' mess and the ship's galley as per existing authorization for the ship's complements at the time of first outfit (BN standard is to be followed).

0551. **Office Equipment**. To meet the ship's administrative functions, the ship's office is to be equipped with the following for each LPC:

a. 2 (two) Cabinets and 2 (two) shelves for stowage of correspondence files and publications.

b. 1 (one) in number combination safe of suitable size for the ship's office.

c. 2 (two)Desktop Computers (Brand- DELL/ HP/ SAMSUNG, processor not less than Core i7 with colour monitor, keyboard, mouse), 1 x Laptop, 3 x laser printers (HP/ CANON), 1 x scanner, speakers, etc., for the ship's office and engineering office are to be provided. A Local Area Network (LAN) facility for this equipment is to be provided.

d. 2 (two) desks with desk light, one file cabinet, two chairs with arms, two chairs without arms, etc.

0552. **Seamanship Items**. Lifting blocks, tackles, shackles of various sizes, grapnels, hand gloves, gum boots, and helmets for undertaking various seamanship activities are to be provided. RAS gear, towing gear, and berthing hawsers are to be provided as per Annex K.

0553. **Deck Washing Machine**. 1 (one) Deck washing machine for each LPC is to be supplied. A necessary fresh water arrangement is to be kept on the open deck.

SECTION VI

ENGINEERING MACHINERY, EQUIPMENT AND SYSTEMS

0601. **General**. The bidder will supply propulsion and auxiliary machinery as part of the package material for the LPCs. However, the machinery should meet certain requirements as described below.

0602. **Propulsion System**. The propulsion system should consist of the following:

a. Two marine diesel engines capable of developing sufficient total power required to attain the maximum ship's speed of at least 24 knots. Standard engine parameter (Standard range of exhaust temperature, fresh water temperature, Lub oil pressure etc.) will not deviate to attain the max ships speed.

b. Each engine will be connected to one reverse reduction gearbox. For single engine operation Gearbox should have trailing capability for an unlimited period if an extra trailing pump/cooling arrangement is required. For single engine operation maximum safe speed is to be mentioned.

c. Each reverse reduction gearbox will be connected to one propeller shaft.

d. The offered port and stbd propulsion system shall be standalone. In case of total power failure, engines, gearbox (Power Take Off- PTO), shafting shall be capable to operate at limited speed. Engine control, alarm monitoring system shall have at least one hour backup battery.

e. The propulsion control system should be able to provide centralized monitoring and control from the Bridge and MCR. The Local Control and Monitoring Panel are to be available in the engine room. Provisions should be kept to operate and engage the engines with the gearbox locally in the engine room.

f. Shaft locking gears are to be provided for each shaft. Arrangements should be made so that, if one shaft is not used, it may be properly locked or allowed to rotate without difficulty.

0603. **Technical Specification of Engine**. The marine engine should meet the following technical specifications:

a.	Model/ Type of engine	:	To be mentioned.
b.	Make	:	(Western origin and manufactured - UK, USA, EU countries, Brand- Caterpillar/ MAN Diesel/ MTU/ Wartsilla).
c.	Country of manufacturing	:	UK, USA, EU countries (To be mentioned).
d.	Year of Manufacture	:	2025 or later.
e.	Cycle	:	4 Strokes.
f.	Aspiration	:	Turbocharged and charge-air cooling.
g.	Fuel Injection	:	Direct fuel injection.

h.	Cooling	:	Freshwater is cooled by seawater through a heat exchanger. There will be engine engine-driven seawater pump as the main pump.
j.	Number of Cylinders and Arrangement	:	To be specified.
k.	Bore and Strake	:	To be specified.
l.	RPM	:	To be specified.
m.	Max Continuous Power	:	To be specified for each engine.
n.	Max power output	:	To be specified (Avoid overpowered engines).
p.	Brake Mean Effective Pressure (BMEP)	:	To be specified.
q.	Idling rpm	:	To be specified.
r.	Time between Top Overhaul	:	Not less than 10,000 hours.
s.	Time between Major Overhaul	:	Not less than 20,000 hours.
t.	Fuel oil to be used	:	High Speed Diesel (HSD) as per NATO/ Defense standard, which is termed as DIESO F-76/ NATO F-76.
u.	Lub oil to be used	:	To be mentioned.
v.	Dry and Wet weight in kg	:	To be specified.
w.	Dimension	:	To be specified.

0604 **Ambient Condition**.

a. Air intake temperature : +45° C (Max).

b. Sea water temperature : +32° C (Max).

c. Humidity : Up to 98%.

d. Highly muddy (suspended) content in seawater in the coastal areas.

0605. **Design and Record of Sales**.

a. The engines should be of new construction, the latest proven model, and up-to-date design

b. Record of sales of quoted model indicating year and place is to be mentioned with the quotation.

0606. **Maintenance Facility**. The following maintenance facilities are desirable:

a. All engines/accessories should be facilitated for easy removal and re-installation.

b. The layout of all machinery and systems should be such that they provide easy access for routine and on-site maintenance.

c. All propulsion engines and generators are to have lifting eyes on top for using chain blocks for the removal and re-installation of heavy components. Necessary 'I'-beams and rails are to be provided.

0607. **Automatic Protection Devices**. The machinery should have the following protection devices:

a. All main engines, prime movers, and other machinery are to be provided with normal protection devices for warning of malfunction and for emergency shutdown. Main propulsion machinery is to be provided with audio and visual warnings.

b. Automatic shutdown will be arranged for high water temperature, low lube oil pressure and engine over speed.

c. Audio and visual alarm for high water temperature, low lubricating oil pressure and engine over speed are to be provided.

d. Over-speed trip gear/emergency shut off device.

0608. **Machinery Control, Monitoring and Alarm System.** Details of the machinery control, monitoring and alarm system are given below.

a. **Machinery Control**.

(1) Arrangement is to be provided to control the propulsion machinery from the Engine Room, MCR and Bridge throughout the range of power ahead and astern as appropriate.

(2) The propulsion diesel engine speed control, throttle and gearbox control are to be arranged for operation from MCR and Bridge by means of a single lever. The selection of the machinery control position (MCR or bridge) is to be provided at MCR.

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

(4) Provision is to be made for starting and stopping the propulsion diesel engines from MCR with local starting and stopping facilities. Emergency stop control of engines is to be provided in the MCR, on the Bridge, and on the engines (Locally).

(5) Control and synchronization of the generators is to be provided from the switchboard located in MCR.

(6) Starting and stopping of each generator is to be provided from a panel mounted adjacent to each set, including remote starting and stopping from the switchboard. An emergency stop control for each generator set is to be provided in the MCR

(7) The mechanical local control system is to be independent of the remote-control system.

(8) A machinery control console is to be provided in the MCR from which each set of propulsion machinery and selected auxiliary machinery can be controlled and monitored.

b. **Monitoring and Alarm System**. The monitoring and alarm system should comprise several alarms for the engines and auxiliary machinery, and are to be located in the Engine Room, MCR and Bridge. Each alarm should be presented with an audible and visual signal, along with a test and acceptance push-button. The following safety devices are to be provided:

(1) Low lube oil pressure alarm (audio and visual) and auto shut down.

(2) High cooling water temperature alarm (audio and visual) and shut down.

(3) High lube oil temp alarm

(4) Low cooling water pressure alarm (audio and visual).

(5) Engine over-speed alarm and auto shut-down device/over-speed trip gear.

(6) Manual emergency shut-off device.

(7) Exhaust gas temperature high alarm.

0609. **Classification**. Type approval certificate of an internationally recognized classification society for the engines, gearboxes, diesel generators and auxiliaries is to be provided.

0610. **Engine Load Test**.

a. Engine load tests up to the maximum permissible limit and time are to be carried out in the factory premises as per the requirements of the classification society.

b. All documents related to the engine load test are to be provided.

0611. **Specific Fuel Consumption (SFC)**. The specific fuel consumption curve of engines is to be provided. Specific fuel consumption at the following ratings is to be specified:

a. Maximum power.

b. Maximum Continuous Rating (MCR).

c. 75% of MCR.

d. 50% of MCR.

e. 25% of MCR.

0612. **Fuel System**. Locally available HSDO is to be used. The proposed fuel system should include the following:

a. Engine-driven fuel delivery pumps with motor-driven fuel priming pump.

b. Fuel pre-filter and fuel duplex filter with changeover valve.

c. Engine governor.

d. Fuel flow meter.

e. Fuel oil pressure and temperature gauge.

0613. **Lubricating Oil System**. Proposed propulsion engines and gearboxes are to use the same type of lubricating oil (SAE 40/ equivalent). The lube oil system for diesel engines and reduction gears is to be arranged in accordance with the manufacturer's requirements. The lubrication system should be of the 'dry sump' type. However, the lubricating oil system should include the following:

a. Engine-driven lubricating oil circulation pump with a safety device to shut off the engine automatically in case of lubricating oil pump failure of the main engine

b. Lubricating oil cooler, with lubricating oil and coolant inlet and outlet temperature gauges. The type of cooler is to be specified. A tubular-type/plate type cooler will be preferred.

c. Pump Motor-driven lubricating oil priming pump. In emergency, the engines can be started without lub oil primed.

d. Lube oil scavenging pump.

e. Lubricating oil duplex filter with changeover valves.

f. One in number lube oil transfer pump of adequate capacity is to be incorporated in the system.

g. Crankcase vent (breather).

0614. **Cooling Water System**. Engine internal cooling is to be done by fresh water with coolant additives (anti-corrosive chemicals). Cooling of this fresh water is to be done by seawater through heat exchangers. Sea water temperature is from 5°C to 32°C. Sea water is muddy in the harbour where the ship is usually berthed, and also in the area where the ship usually operates. The cooling water system should include the following:

a. Self-priming engine-driven seawater and fresh water circulation pumps with discharge pressure gauges.

b. Fresh water cooler with seawater and fresh water inlet and outlet temperature gauges and coolant thermostat. The type of cooler is to be specified. A tubular-type cooler will be preferable.

c. Fresh water expansion tank with vent pipe.

0615. **Starting System**. The Main Engines are to be started by compressed air. The required number of starting air compressors with appropriate capacity is to be provided, or else compressed air for starting engines may be taken from the ship's compressed air system.

0616. **Shutdown System**. The engine shutdown system may include the following:

a. Normal shutdown via the injection pump both with the engine and at the remote-control panel (if provided).

b. Emergency shutdown via emergency air-shutoff flaps by stopping the combustion air supply.

c. Shutdown system available with engines, MCR, and bridge.

0617. **Combustion Air System**. The following may be included with the combustion air system:

a. Turbocharger.
b. Charged air cooler.
c. Set of air intake adapters and filters.

0618. **Exhaust System**. Among others, the system should have the following:

a. Provisions for monitoring exhaust temperature through gauge/ display of combined cylinders /individual cylinder and supply of temperature gauge/ display for turbocharger.

d. Expansion bellows between the turbocharger and the main exhaust pipe.

c. Exhaust silencers.

d. Exhaust flaps.

0619. **Mountings**. The LPCs can withstand underwater shock from an explosion. Engine mountings will be as per the recommendations of the engine manufacturer and class standards. The mountings will absorb shock and vibrations resulting from engine operation without suffering disproportionate distortion. The following should be supplied with each main engine

a. Required number of shock mountings (Naval standard)

b. Vibration mountings as required (Naval standard).

c. Combined bed plate to match with engine seating.

d. Lifting eyes.

0620. **Torsional Vibration Damper**. The engines are to be fitted with a torsional vibration damper as per the class standard to withstand high-impact mechanical shock.

0621. **Power Transmission**. Engine power should be transmitted through:

a. Heat and oil-resistant torsional resilient coupling approved by the Classification Society.

b. Coupling is to be integrated and aligned with the engine and gearbox, with the necessary connecting hardware.

c. Main engine power will drive the propeller via the gearbox and shafting.

0622. **Gear Box**. Each main engine is to drive one propeller via a reverse-reduction gearbox of Western origin (UK, USA, EU countries) & manufactured in western countries (UK, USA, EU countries) of a standardized brand (REINTJES/ ZF AG/ MASSON MARINE/ MTU), compatible with the main engine. Engine, gearbox, and propeller shafts are to be mounted 'in-line'. The gearbox will be flanged to the engine and will take the axial thrust. In case of total power failure to keep propulsion running gearbox should be capable to operate by PTO/any other suitable systems. The gearbox details, including the reduction ratio, are to be specified. The gearboxes are to have a provision for unlimited trailing operation. If required, separate trailing pumps are to be added. Details of the gearbox are as follows:

a. **Clutch Control**. Each clutch is to be operated remotely and an emergency clutch control mechanism should also be provided on the gearbox.

b. **Mounting of the Gearbox**. Rigid mounting type. The gearbox housing mounting is to be rigid.

c. **Oil Filter**. Duplex-type oil filters are to be mounted on the gearbox.

d. **Oil Pressure Gauges**. The gearbox is to be fitted with oil pressure gauges, as required, for local and monitoring of the clutch oil and lubricating oil systems.

e. **Turning Device**. Arrangement will be made to turn the propeller shaft.

f. **Lube Oil Cooler**. A tubular type lube oil cooler is to be mounted on or near a gearbox. Sea water to the gearbox is to be supplied from a separate seawater pump with emergency cooling from the fireman

g. **Temperature Gauges**. Temperature gauges are to be provided for oil temperature and for inlet and outlet seawater temperatures of the cooler.

h. **Monitoring**. The following monitoring systems will be fitted in the engine room (local) and MCR/Bridge (remote):

(1) Lube oil pressure and temperature - Engine room (local) and MCR (remote).

(2) Sea seawater pressure gauge will be installed in the Engine room.

(3) Cutch engage/disengage status - Engine room (local), MCR (remote), and Bridge (remote)

(4) Bearing temperature - Engine room (local preferred).

(5) Main engine running status - Engine room (local), MCR (remote), and Bridge (remote).

0623. **Propeller**.

a. Fixed Pitch Propeller (FPP) made of Nickel-Aluminum-Bronze alloy or any other suitable material of origin and manufactured (Country of OEM to be mentioned) should be fitted for the nominal marine diesel engine torque. The propellers are to be class-approved by the internationally recognized classification society of BV or LR.

b. The detailed technical information, including weight, diameter, pitch, BAR, number of blades, material, etc., is to be included in the offer.

0624. **Technical Particulars of Shafting**. Technical particulars of shafting are as follows:

a. **Propeller Shaft**. Two in number propeller shafts originated and manufactured (Country of OEM to be mentioned) with accessories are to be made of high-quality forged steel/stainless steel in accordance with the requirements of the internationally recognized classification society. The shafts will be protected against seawater by GRP coating, if necessary. The shaft should have sufficient strength to transmit the power of the engines during the ship's entire life. The shafts should have an arrangement for easy removal during docking.

b. **Stern Tube and Brackets**. Each stern tube is to be made from a thick-walled steel pipe, welded to the hull and supported aft by V-configuration/single-arm brackets. The stern tube is to be sea water cooled and provided with rubber sealing glands fore and aft.

c. **Propeller Shaft Sealing**. The stern tube is to be sealed fore and aft by grease-lubricated radial seal rings as necessary by class rules. The type/model of packing is to be mentioned.

d. **Stern Tube Lubrication**. The stern tube is to be lubricated by seawater.

e. **Shaft Brake and Locking Gear**. Each propeller shaft is to be provided with the necessary brake and locking gears. These should be sufficient to stop the shaft when the other shaft is running at normal speed.

f. **Turning Device**. Arrangement is to be made to turn the propeller shaft.

g. **Plummer Block and Watertight Bulkhead Gland**. A plumber's block and water-tight bulkhead gland are to be installed in accordance with the relevant classification rules.

0625. **Thrust block**. Arrangement is to be made to absorb the propeller thrust for ahead and astern movement of the ship in accordance with the relevant class rules.

0626. **Sensors, Indicators and Gauges**. Required temperature, pressure, and speed-measuring devices (Sensors, Indicators, gauges) and any other instruments/devices recommended by the respective manufacturers are to be suitably positioned on panels mounted on/near each of the propulsion machinery, and these are to be as simple as possible and easily replaceable.

0627. **Instruments to be mounted on Main Engines**. The following instruments, along with piping and cables, are to be supplied and fitted with the local control panels, which in turn

are to be mounted on or near each of the main engines. However, the instruments must not be limited to the following list.

a. Sea water pressure gauge and displays.

b. Sea water temperature gauge and displays.

c. Fresh water pressure gauge and displays.

d. Fresh water temperature gauge and displays.

e. Fuel delivery pressure gauge and displays.

f. Fuel filters differential pressure gauge and displays.

g. Lubricating oil pressure gauge and displays.

h. Lubricating oil temperature gauge and displays.

j. Lubricating oil filter, differential pressure gauge, and displays.

k. Exhaust temperature gauge (for combined individual cylinder) or displays.

l. Engine speed indicator (Tachometer).

m. Engine's running hour meter (Hour counter).

n. Low lubricating oil pressure alarm (visual and audio) for main engine with trip mechanism.

p. Low lubricating oil pressure alarm (visual and audio) for gearbox.

q. High fresh water temperature alarm (visual and audio).

r. Low fresh water pressure alarm (visual and audio).

s. Engine over-speed alarm (visual and audio) and trip mechanism.

0628. **Remote Control from MCR**. Each local control desk must be equipped with at least the following. However, the list must not be limited by the following.

a. Telegraph transmitters for both main engines.

b. Engine speed control throttles/levers or switches.

c. Engine rpm indicators (independent and direct reading).

d. Engine stop switches.

e. Engine fresh water temperature gauge (independent and direct reading).

f. Engine lube oil pressure gauge (Independent and direct reading).

g. Gearbox lube oil pressure gauge.

h. Engine exhaust temperature (combined) gauge.

j. Control levers/ switches for ahead/astern/neutral position of both gearboxes.

k. Changeover switches to shift throttle contract from engine local control to MCR, vice versa and from MCR to wheel house, vice versa

l. Alarms (Visual and audio) in case of

(1) Engine over speed.

(2) Low engine lube oil pressure.

(3) Low gearbox lube oil pressure.

(4) High engine coolant temperature.

(5)Engine overloaded alarm.

0629. **Remote Control from Bridge**. The control desk for both engines and gearboxes is to be located in the ship's wheelhouse. The control desk is to be equipped with the following instruments. However, the list must not be limited by the following.

a. Engine speed control throttles/levers.

b. Main engine rpm indicators.

c. Shaft rpm indicators.

d. Gearbox control levers for ahead, astern and neutral position for both Gearboxes.

e. Engine telegraphs' transmitters.

f. Engine stop switches.

g. Alarm (visual and audio) and emergency shutdown in case of

(1) Engine over speed.

(2) Low engine lubricating oil pressure.

(3) Low gearbox lubricating oil pressure.

(4) High engine coolant temperature (only alarm).

(5) Engine overloaded alarm.

0630. **Ship's Compressed Air System**. A suitable high-pressure compressed air system is to be provided to supply compressed air for starting engines/prime movers (may be via a starting air compressor through a reducing valve) as well as for the ship's services and charging facility. Reducing valves are to be arranged as needed. Details of the Compressed air system are to be mentioned.

0631. **Generating Plant, Diesel Engines for Generators**. 3 x Identical Main Generator & 1 x Emergency DG will be supplied as per the BN's standardized model mentioned in article 0707. Each Main Genset should able to take full load independently (operational and combat) with at least 5% surplus power. The emergency DG should be capable of meeting the electrical load requirement for safe navigation/sailing. The prime mover engines are to be as per the specification given in the latter part.

0632. **Fresh Water System**.

a. **Fresh Water Hydrophore System**. Freshwater will be supplied via a hydrophore system comprising two pumps and one hydrophore tank. It should be arranged to provide a continuous supply from storage tanks to the general water supply system and machinery feed water system throughout the ship. One pump and a hydrophore tank should serve as the main and another pump will remain as a standby. Fresh water supply is to be given to the galley, sanitary spaces, dining space, and engine room. Details of the Fresh Water Hydrophore System are to be mentioned.

b. **Fresh Water Generating System**. A freshwater generating system (Reverse Osmosis) is to be provided on board to generate fresh water from seawater. The capacity should be commensurate with the ship's complement and the space available on board. The system should be independent of the ship's propulsion system.

c. **Fresh Water Tank System.** Built-in storage tank(s) in the main hull, with sufficient capacity to serve 75 persons for 7 days as per the class requirement, will be provided. The tank(s) will be equipped with modern sounding arrangement, overflow pipes/cocks on the deck, etc., and will be connected by piping to the fresh water hydrophore system,

d. **Drinking Water Treatment Unit.** A separate drinking water treatment unit will be supplied. Details of the drinking water treatment unit are to be mentioned.

0633. **Fire main System (Ship's Main Sea Water System)**.

a. The fire main system will be of 'dry type' Fire main system is to be fitted with a single main line served by 2 (Two) fire and bilge pumps fitted in the machinery space. The fire and bilge pumps draw suction from the sea chest via a strainer and discharge to the fire main via an isolating valve. Operational pressure checks will be performed during HAT/SAT.

b. The fire main system should always maintain sufficient pressure to provide seawater for the following systems/points:

(1) Fire hydrants on designated places throughout the whole ship.

(2) Sprinkler system for ammunition store/magazine.

(3) Emergency cooling system of the required machinery.

0634. **Domestic seawater Hydrophore System**. Sea water is to be supplied to the lavatories, bathroom, galley, and engine room through a seawater hydrophore comprising a pressure tank of the required capacity and 2 x electrical centrifugal pumps. The specifications for the seawater pumps and hydrophore tank are to be the same as for the freshwater pumps and hydrophore tank, except that the hydrophore tank is to be made of corrosion-resistant material.

0635. **Sewage System**. A Sewage Treatment Plant is to be provided. Details of the system are to be mentioned.

0636. **Bilge Suction and Deck Wash System**.The engine room, steering gear compartment, accommodation compartments below deck 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 to a seawater inlet and are to be provided at the pressure side, with one storm valve in the engine room, at the main deck, and at the foxl deck for firefighting/deck wash purposes. The bilge suction should be fitted with a galvanized suction strainer. The same pumps will be used to maintain pressure in the fire main line.

0637. **Sea Chests/Sea Inlets**. Appropriate numbers of sea chests are to be integrated in the hull bottom construction in the engine room. The sea chest is to be of welded steel construction, with a dismountable galvanized grating flush-mounted to the bottom. Each sea chest is to be provided with a vent hole at the topside and a drain hole at the bottom.

0638. **Fuel Oil Tank and System**. The fuel tank capacity should be such that the desired endurance of at least 2500 nautical miles at economical speed can be achieved at the consumption of the total fuel oil capacity. The fuel oil tanks will be connected via pipes and valves. The system is to consist of the following:

a. Two in No fuel transfer pump to transfer fuel oil between the tanks

b. One in No strainer of simplex type at the suction side of each pump.

c. The service system shall be arranged in accordance with the requirements of the engine manufacturer.

d. A provision for controlling the fuel oil tank valves remotely from the main deck (emergency stopping) is to be made.

e. The specifications of the fuel oil transfer pump should be as follows:

(1)	Number	: Two.
(2)	Type	: Gear.
(3)	Capacity	: min 20 m^3/h.
(4)	Pressure head	: min 3 bar or more.
(5)	Drive	: Electric motor.
(6)	Country of origin	: To be mentioned
(7)	Country of manufacture	: To be mentioned

f. Separate storage facility for gasoline (petrol) for the ship's boat (approximately 280 liters).

0639. **Lubricating Oil Tank and System**. Propulsion engines, Diesel generator engines and gearboxes are to use the same type of lubricating oil (SAE 40 or equivalent, which must be available in the Bangladesh local market). One lubricating oil tank of adequate capacity is to be built in the engine room with a steel filling and de-aeration pipe to the main deck and a sounding pipe in the engine room. The de-aeration pipe is to be provided with a flame-arresting cap. Dirty lubricating oil from the engine sump will be discharged via a hand pump to a dirty lube oil tank. The lube oil system for diesel engines, generators, and reduction gears

will be arranged in accordance with the manufacturer's requirements. One lube oil transfer pump of adequate capacity is to be incorporated in the system.

0640. **Air Conditioning and Ventilation**. Arrangement of the ventilation and air conditioning system will be as follows:

a. **Air Conditioning Plant**. One central air conditioning plant with an alternative arrangement to be installed on board the LPC with an air handling unit and ducting to provide conditioned air for operational and living spaces, including accommodation spaces, closed bridge, machinery control room, office spaces, magazine, and diving store, etc., under the following conditions:

(1) **Environmental Conditions**.

(a) Dry bulb temperature : 35-42° C.

(b) Relative Humidity : Up to 98%.

(2) **Desired Conditions**.

(a) Dry bulb temperature : 18° C to 24° C.

(b) Relative Humidity : 50%

(3) **Details**. Details of the central air conditioning plant are as follows:

(a) Type: Marine type.

(b) Quantity:1 complete set per PC.

(c) Country of origin: USA, UK, EU Countries, Norway, Switzerland (To be mentioned).

(d) Country of Manufacturing: USA, UK, EU Countries, Norway, Switzerland (To be mentioned).

(e) Year of Manufacture: 2025 or later.

(f) Number of compressors: 2 (one in operation and one standby).

(g) Type of compressor: Semi-hermetic.

(h) Rotary/Reciprocating/screw compressor: Screw compressor.

(j) Number of condensers: 2 (one in operation and one in standby).

(k) Type of condenser: Shell and tube type.

(l) Type of AHU: Vertical, ceiling, or bulkhead-mounted type, concealed or open installation type.

(4) Additional marine type air conditioner units need to be provided in Bridge, CIC, MCR and MCO for keeping cool the sensors, equipment and work stations to ensure smooth operational activities of the of ships.

b. **Ventilation of Engine Room.** An appropriate arrangement is to ensure engine room ventilation (considering the ambient conditions). The requirement for supply blowers needs to be ascertained by the bidder, as per the aspiration needs of the proposed engines, and they are to be provided. Exhaust blowers of adequate capacity are also to be fitted in a convenient place in each engine room. The number, size, and capacity of supply and exhaust blowers are to be specified.

c. **Ventilation of Galley, Sanitary Spaces and Magazine Rooms**. Supply and exhaust blowers of adequate capacity are to be fitted in convenient places for proper ventilation of galley, sanitary spaces, magazine rooms, etc. (i.e., the spaces that are not air-conditioned). The number, size, and capacity of supply and exhaust blowers are to be specified.

0641. **Refrigerating Plant**.

a. The refrigerant plant should have sufficient capacity to maintain a fresh provision of at least 10 days for the whole complement. The refrigerant should be environmentally friendly and have a low GWP.

b. A detailed specification of the refrigerating plant is to be submitted with the quotation. They should be compatible with shore supply voltage.

c. The plant will be compatible with the ship's electrical supply, and separate cooling pumps will be used for the plant. The refrigeration plant will be direct. The plant will be suitable for keeping the goods fresh on the ship. Its main function will be to maintain the required temperatures for the fish & meat room at -18°C and the vegetable room at +2°C—an alternative arrangement (standby compressor) will be available.

d. The country of Origin : USA, UK, EU Countries, Norway, Switzerland

e. Country of Manufacturer: To be mentioned.

0642. **Piping**. Piping of various systems should 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 of classification.

b. The dimensions of pipes, valves, and fittings are to be in accordance with the relevant rules of classification standards unless otherwise specified.

c. Adequate pipe supports are to be suitably located to take the weight of the piping, insulation lagging. Supports should carry the loads imposed by piping expansion/contraction and prevent excessive vibration under all operating conditions.

d. Gauges, thermometers and their respective connection for local or remote reading are to be provided as necessary to indicate the pressure and temperature of Individual and combined units of associated equipment.

e. Gauges and thermometers are to be installed in such a manner that their removal should not interfere with the operation of the system. Shut-off valves may be used for this purpose.

f. Where piping runs over equipment, proper protection of said equipment should be provided from leaks or dripping through the piping for any damage.

g. Unless necessary, flanges or screwed joints are not to be located over electrical equipment.

h. Whore piping is placed in the way of machinery and equipment that require dismantling for periodic overhaul or excess to other systems; removable sections are to be arranged in those cases.

j. Where piping or its components penetrate a watertight or oil-tight structure, suitable bulkhead pieces are to be arranged.

k. All gaskets are to be of such material that resists attack by the fluid carried in the pipeline; they are to be strong enough to hold the pressure and perform the purpose intended.

l. Pipes are to be marked with colour bands for identification.

m. Insulation on piping is to be provided where necessary.

n. All valves are to have brass name plates suitably engraved to indicate the function of the valve clearly. Engraved letters shall be filled with black or red enamel paint.

p. Temporary strainers are to be installed in the lube oil piping for cleaning and flushing the system.

q. Sharp/right-angled bending of pipes is to be avoided.

r. Materials of different piping systems are to be as follows:

(1) Fresh water system: To be mentioned (Preferably sstainless steel pipe).

(2) Scupper and drains: To be mentioned (Preferably sseamless steel pipe).

(3) Fire main system: To be mentioned (Preferably Cu-Ni pipes).

(4) Bilge system: To be mentioned (Preferably Cu-Ni pipes).

(5) Domestic seawater system: To be mentioned (Preferably Cu-Ni pipes).

(6) Sprinkler system: To be mentioned (Preferably Cu-Ni-Fe pipes).

(7) Fuel oil system: To be mentioned (Preferably seamless steel pipe).

(8) Lube oil system: To be mentioned (Preferably seamless steel pipe).

(9) Hydraulic system: To be mentioned (Preferably seamless steel pipe).

s. All seawater cooling systems (main engine, main fridge, air conditioning system, etc.) and sanitary systems will have proper isolation for independent operation and maintenance.

0643. **Heat Exchangers**. Heat exchangers should meet the following requirements:

a. **Engine Fresh Water Cooler**. Tubular heat exchangers of adequate capacity suitable for a tropical environment are to be installed with each main engine and diesel generator. The heat exchangers should be supplied with seawater from the sea chests. Provisions for opening the chests for inspection are to be made. Detailed information about the type of cooler is required.

b. **Lubricating Oil Coolers**. Lubricating oil coolers of adequate capacity are to be incorporated in each engine layout and gearbox.

0644. **Air and Exhaust Arrangement**.

a. The turbochargers are to obtain air suction via air filters from the well-ventilated engine room.

b. Exhaust gases from main engines and diesel generators are to be led to the atmosphere via a dry-type exhaust silencer on the ship's side.

c. Expansion pieces are to be arranged for exhaust systems where necessary. The exhaust system is to be insulated with about 50 mm-thick mineral wool, with galvanized steel, using a suitable portable arrangement of flanges and expansion pieces.

d. Drain outlets are to be arranged at silencers.

e. Suitable thermometers/pyrometers are to be fitted into the air inlet and exhaust lines.

f. An exhaust flap is to be fitted with each exhaust pipe.

g. Each main diesel engine and diesel generator will be fitted with a separate exhaust flap.

0645. **Filling, Sounding and De-aeration System**. The fuel and lube oil tanks are to be provided with filling and de-aeration piping with flame-arresting caps. Fresh water filling pipes should have bronze caps secured by chains. The freshwater sounding pipes are to be located in the accommodation compartments.

0646. **Fin Stabilizer**. A fin stabilizing system to reduce the ship's roll sufficiently for the efficient operation of the ship's weapon and machinery, and crew comfort is to be installed. Country of Origin and Manufacturer shall be from USA, UK, EU Countries, Norway, Japan, Switzerland.

0647. **Protection against Marine Pollution**. The LPCs will have IMO-approved means for disposing of garbage, oily water, sewage, and other waste.

0648. **POL and Chemicals**. Sufficient quantity of the following items is to be provided to run the machinery for test and trial and till handing over to BN:

a. Fuel oil for all machinery/engines/generators.

b. Lube oil for Main engines, Diesel generators and Gearboxes, including other systems using lubricating oil.

c. Lube oil and refrigerant for air conditioning and refrigerating plants.

d. Special-purpose greases.

e. Cooling water inhibitor for main engines and diesel generators.

f. Lube oil test kit and chemicals.

0649. **Manuals and Drawings**. The following manuals and drawings (3 copies of each in English) may be provided:

a. Operation, maintenance and repair manuals of the main engine, auxiliary machinery and gearbox.

b. Parts catalogue (with identification diagram) of main engine, auxiliary machinery and gearbox.

c. Installation drawings and diagrams for main engines and their local and remote controls.

d. Workshop-level repair manual.

e. Installation drawings and diagrams for the gearbox and its controls.

f. Main engines and gearbox maintenance schedule.

SECTION-VII

ELECTRICAL EQUIPMENT, MACHINERY AND SYSTEMS

0701. **General**.

a. All electrical systems, equipment, machinery, fittings, fixtures, cables, and wiring shall comply with recognized marine standards.

b. All electrical equipment shall be tropicalized and provided with Class F insulation unless specified otherwise. The maximum permissible temperature rise for all electrical equipment and wiring shall be based on an ambient temperature of 45°C with a relative humidity of approximately 95%.

c. All machinery which are temporarily or permanently exposed to the outside atmosphere or water shall have a protection rating of IP56.

d. Electrical equipment shall be designed and located for easy access for repairs and removals. Equipment shall be located to minimize damage.

e. The casings of all electrical machines/equipment are to be properly earthed (grounded). All earthing points are also to be provided for portable electrical equipment, as required. All electrical equipment is to be interference-free as per the manufacturer's requirements.

f. All wiring, cables, breakers, distribution panels, machines, etc. are to be clearly labelled and systematically coded for ease of identification. The recognized warship standard of "Procedure of Identification of Electrical Circuit in Warship" is to be followed.

g. Necessary documents, drawings, circuit diagrams of electrical and Electronic Items, including the detailed description of the items, are to be provided.

h. Red, Yellow and Blue colors are to be used to identify the 3 phases of cables, busbars, terminals etc. of an AC circuit.

j. Red and Black colors are to be used to identify positive and negative polarity of cables, busbars, terminals etc. of a DC circuit.

k. Provide a Star-Delta starter for all electrical motors with a load capacity above 3 kW.

0702 **Ship's Main Power System**.

a. The main power supply system will be designed and developed as a complete solution to enable the LPCs to run at full efficiency both at sea and inharbour.

Accordingly, all electrical machinery should be so designed in 415 ±10%, 50Hz, 3 Phase with other necessary arrangements.

b. In case of precision equipment sensitive to voltage and frequency change required for harbour use, two sets of converters/voltage regulators (as per load calculation to be submitted by the bidder), along with other necessary gears, will be installed onboard. ,

c. Necessary load calculation and load management information for sea and harbour are to be submitted with the quotation.

0703. **Schematic Diagram**. A schematic diagram of the ship's electrical distribution system shall be submitted with the offer. A detailed diagram of the electrical distribution system is to be provided with the ship. (Articles 0709 and 0710).

0704. **Electrical Load Analysis**. Electrical load analysis shall be submitted with the quotation showing the following parameters:

a. Maximum operational load (when all systems and armament are operating).

b. Cruising Load. (When all necessary systems are operating).

c. Load at anchor (when all necessary systems with navigational and communication equipment are operating).

d. Harbour/ Shore Load (when all necessary systems with communication equipment are operating).

0705. **Provision of Power for Future Equipment**. A 25% reserve provision for all types of electrical power is to be arranged for the future installation of machinery & equipment.

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

a. Four in number, Identical Main Generators with Automatic Transfer Switch (ATS).

b. Two in number, the Main Switchboard of warship standard with paralleling capacity of three DG, and each DG capable of taking the full load of the ship. The other one will act as the harbor DG.

c. Class standard approved Distribution Panel/ Switches as required.

d. Required number of motors, pumps and auxiliary machinery (Class standard approved) as required following the international standard for a warship.

e. **Conversion Machinery**.

(1) Number of Transformers (415±10%V/115V, 50Hz, 3 Phase and 415±10%V/220V, 50Hz, 3 Phase) as required of appropriate capacity is to be mentioned during the offer.

(2) Rectifiers 110V DC and 24V DC as required for FCS, Guns, Torpedo/SSM, and Sensors, etc., of appropriate capacity.

f. **Shore Supply Arrangement**.

(1) One in number suitable Shore Supply Connection Box rated at 415±10%V, 3-phase, 50 Hz and of appropriate ampere ratings.

(2) One in number shore supply cable of 200 m length rated at 415±10%V, 3-phase, 50 Hz and of appropriate ampere ratings.

(3) Ship along sides supply arrangement with breaker (See Article 0713).

g. **DC Power Backup**.

(1) One in number Battery Switch board.

(2) General Use Battery as required is to be provided (number is to be mentioned).

(3) Communication Battery as required (number is to be mentioned)

(4) Emergency supply for engine control and monitoring, navigational equipment/ lights etc., for her safety at sea.

(5) Battery capacity is to be calculated so that general-use batteries shall operate continuously for at least 2 hours. Communication batteries should also support at least 2 hours of continuous operation.

(6) Battery Chargers as required are to be provided (number is to be mentioned).

h. **General Alarm**. Action (combat), Emergency, NBC, general, etc.

j. **Alarm System for Engine Room**. Heat, flood, fire, smoke, etc.

k. **Man Overboard Alarm**. At fox'l and after the deck area.

l. **Ship's Internal Communication.**

(1) Integrated communication system (ICS) including internal telephone system, internal broadcast system, gun intercom system & machinery intercom system.

(2) Internet/ LAN facilities covering office spaces, mess deck, accommodations space, etc.

(3) Central TV receiving system covering office spaces, mess deck, accommodations space, etc.

0707. **Main Generator Sets**. An electrical power generation system consisting of three identical marine-type three-phase generators and one emergency genset with appropriate capacity is to be installed. Each Main Genset should able to take full load independently (operational and combat) with at least 5% surpluse power. 2 X DGs (of any three main DGs) can run for a long-term in stable condition. Emergency DG shall capable of carrying necessary load for safe navigation/sailing of the vessel. Generators should be suitable for continuous operation in parallel conditions. The generator sets are to be fitted with instrument panels and all standard safety devices, including emergency shutdown devices. The requirement of the main generators is outlined below:

a. **Specifications of Main Generator and Emergency Generator Set**. Each generator set shall be of the following specification:

(1)	Country of Manufacturing	:	UK/ USA/ EU Countries.
(2)	Country of Origin	:	UK/ USA/ EU Countries.
(3)	Year of Manufacture	:	2025 or later.
(4)	Voltage	:	400V
(5)	Maximum Continuous Rating	:	Combat load plus 5% reserve for each main DG. For emergency genset to be mentioned.
(6)	Type of Operations Required	:	Continuous duty (could be for days at a stretch).
(7)	Overload rating	:	To be specified.
(8)	Minimum allowable continuous load (low load running)	:	To be specified
(9)	RPM	:	To be mentioned (preferably not more than 1500 rpm).

(10) Overall weight and dimension : To be mentioned

(11) **Transient Voltage Variation**. The transient voltage and frequency variation are to meet the naval vessel standard and are to be mentioned:

(a)	Transient voltage rise when at full load condition, total load is taken off	:	To be mentioned.
(b)	Transient voltage dip when at off-load condition, the full load is added	:	To be mentioned.
(c)	Recovery time to reach 97% of the rated voltage of above mention loading conditions	:	To be mentioned
(d)	Transient Frequency Variations at various loading conditions.	:	To be mentioned

Note: Graphs showing various characteristics and responses of transient voltage and frequency variations are to be submitted with the vessel

(12) **Loading Condition**. The generators will be subjected to sudden inductive loads, such as 3-phase induction motors, during which the starting transient current will be very high (about 5 times the rated current). Under such circumstances, the output voltage should remain sufficiently stable so that the precision electronic equipment of the ship can be operated without any problem. The governor and AVR system must be highly responsive and should meet the necessary conditions.

(13) **Coupling**. Double-bearing alternators to be flanged to the prime mover (engine) using a flexible coupling.

(14) **Combined Base Frame**. The diesel engine and the alternator of each generator set are to be mounted on a combined base frame and rigidly fixed to the generator seating. Provide lifting eyes for handling the complete generator set as a unit, as well as for the engine and alternator individually.

(15) **Mounting**. The generators are to be installed with standard shock and anti-vibration mountings along with holding-down bolts.

b. The detailed specifications of the main generators are to be submitted with the offer.

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

(1)	Brand	:	Origin: USA, UK, EU countries Brand: Caterpillar, MAN Diesel, MTU, Wartsilla, SCANIA (To be mentioned).

(2)	Country of Manufacturing	:	UK/ USA/ EU Countries.
(3)	Country of Origin	:	UK/ USA/ EU Countries.
(4)	Type	:	Marine
(5)	Number of cylinders and arrangement	:	To be mentioned
(6)	Compression ratio	:	To be mentioned.
(7)	Aspiration	:	Turbocharged and after-cooled.
(8)	Combustion	:	Direct fuel injection
(9)	RPM	:	To be mentioned (Preferably not more than 1500 rpm).
(10)	Brake Mean Effective Pressure (BMEP)	:	To be specified.
(11)	Power	:	To be mentioned. It should meet the alternator requirements per the marine standard to provide the required power at the continuous rating and at the overload rating at 45°C air and 32°C sea water temperatures.
(12)	Specific fuel consumption at rated Maximum Continuous Rating	:	To be mentioned.
(13)	Specific lube oil consumption at rated power	:	To be mentioned.
(14)	Combustion air requirement	:	To be mentioned.

(13) **Governor**. A 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 respond instantaneously to any change in inductive/ resistive load (from 0 to 100% of rated load).

(14) **Turbocharger**. Make, model may be specified.

(15) **Fuel Oil to be used**. High Speed Diesel Oil (HSDO) of sulphur content is to be less than 1.0% by weight.

(16) **Lub Oil (to be used)**.Suitable SAE 40 or equivalent is available in the Bangladesh market.

(17) **Starting System**. The generator is to be started by compressed air. Necessary arrangements are to be made in this regard.

(18) **Time between Overhauls**.

(a) Major Overhaul. To be mentioned.

(b) Top Overhaul. To be mentioned.

(19) **Accessories**. Standard accessories as required are to be fitted.

(20) **Engine Control and Monitoring Panel**. The following meters and gauges are desirable in the engine-mounted engine control and monitoring panel:

(a) **Motors**.

i. RPM tachometer.
ii. Hour counter.

(b) **Gauges**

i. Lub oil pressure gauge
ii. Sea water pressure gauge.
iii. Fresh water pressure gauge
iv. Fuel oil pressure gauge.
v. Lub oil temperature gauge.
vi. Fresh water temperature gauge.
vii. Exhaust temperature gauge (combined).
viii. Lub oil filter differential pressure gauge.
ix. Fuel filter differential pressure gauge.

(21) **Safety Devices**. The following safety devices are to be provided in each generator set:

(a) Low lubricant oil pressure alarm (audio and visual) and auto shut down.
(b) High cooling water temperature alarm (audio and visual).
(c) High lub oil temp alarm.
(d) Low cooling water pressure alarm (audio and visual).
(e) Engine over-speed alarm and auto shut-down device/over-speed trip gear.
(f) Manual emergency shut-off device.

(22) **Dimension and Weight**. The dimensions and weight of the prime mover are to be mentioned.

d. **Specification of Marine Alternators**. Each of the alternators is to be of the following specification:

(1) **Type**. Self-exciting, self-regulating, revolving field brushless alternator with permanent magnet exciter/auxiliary regulation excitation system (ARE)

(2) **Standard and Classification**. The marine alternators will conform to IEC 34-1 and other international standards, such as NFPA 51-111, UTE 5100, VDE 0530, BS 5000, IEC 2.3, NMEA, IEEE, CSA, etc., as applicable. Radio suppression is to be in accordance with BS 800 or equivalent, and surge protection is to be as per the IEC standard applicable to a seagoing ship with a high-noise, high-voltage-spike source. The marine alternators are to be supplied with certificates issued by an internationally recognized classification society standard.

(3)	Name of Brand	:	STAMFORD/ LEROY SOMER.
(4)	Country of Manufacturing	:	UK/ USA/ EU Countries.
(5)	Country of Origin	:	UK/ USA/ EU Countries.
(6)	Country of origin	:	UK/ USA/ EU Countries.
(7)			
(8)	Model/ type	:	Marine
(9)	Number of poles	:	Four or more.
(10)	Maximum continuous rating	:	Combat load plus 25% reserve by paralleling 2 DGs.
(11)	Power factor	:	0.8 lagging.
(12)	Rated Terminal Voltage	:	To be mentioned. (415 ±10%, 50Hz, 3 Phase).
(13)	Frequency	:	Refer to Article 0702 (415 ±10%, 50Hz, 3 Phase). To be mentioned.
(14)	No of phases	:	3 (three).
(15)	Speed	:	To be mentioned (Preferably not more than 1500 rpm).
(16)	Rotor	:	Dynamically balanced after winding as per BS 49999/50 and with a surge voltage suppression device wound on

			field poles.
(17)	Stator	:	Durable winding in a star configuration with high-grade electrical steel or equivalent.
(18)	Connection	:	3-wire, star connection, neutral ungrounded.
(19)	Excitation	:	Shunt with Permanent Magnet Generator (PMG) excitation system, Auxiliary Regulation Excitation system (ARE).
(20)	Ventilation	:	Self-ventilated, air-cooled, air temperature up to 45°C.
(21)	Insulation	:	F
(22)	Temperature rise	:	To be mentioned.
(23)	Enclosure	:	IP 23 or better.
(24)	Number of Bearings	:	2 x bearings, re-greaseable type.
(25)	Space heater	:	To be provided. It is to be interlocked with the generator breakers. The space heater lamps are to be fitted on the switchboard for indication.
(26)	Stator temperature detectors	:	Shall have embedded temperature sensors in each phase for protection—temperature readings to be shown on the main switchboard.
(27)	Parallel operation	:	Both auto- and manual-parallel operation systems are to be incorporated. A droop kit for continuous parallel running with both generators is to be provided.
(28)	Overload and motor starting.	:	10% overload for 1 hour every 12 hours.

(29) **Auto Voltage Regulator (AVR)**. The AVR is to be electronic, with three-phase sensing devices. The following should be included in the AVR:

(a)	Voltage adjustment range	:	Should be ±10 % of the rated value.
(b)	Sensing input voltage	:	3 Phase sensing.
(c)	Steady-state stability	:	Should be within 0.5% of the RMS rated value.
(d)	Remote hand voltage trimmer	:	A voltage trimmer at the switchboard to adjust voltage by hand.
(e)	Over excitation protection and indication	:	To be incorporated.
(f)	Thermal trip protection and indication	:	To be incorporated.
(g)	Short circuit characteristics	:	As per the naval vessel requirement.
(h)	Over and under-voltage protection	:	To be incorporated.
(j)	Over and under-frequency protection	:	A detailed description of the AVR is desirable with the quotation.

(30) **Alternator Warning and Shutdown Indications**. To ensure safety,the following warning and shutdown devices are recommended for each alternator panel inthe Main Switchboard.

(a) Overload.

(b) Short circuit condition.

(c) Synchronization failure.

(d) Over/ under voltage indication.

(e) Reverse power indication.

(f) Under frequency indication.

(g) Excitation loss.

(31) **Control Panel**. The following components are to be included with the generator-mounted control panel:

(a) Panel lights with an ON/ OFF switch.

(b) Over-speed protection device.

(c) Visual/audible alarm device.

e. **Generator Control Panel**. All necessary gauges/meters, including kW meters, are to be fitted in the control panel.

0708. **Main Switchboard**.

a. **Type**. Two in number Main Switchboard is to be supplied and installed. Both switchboards with internal components shall be marine-type, floor-mounted, and capable of withstanding shipboard vibration without damage or faulty operation. The switchboard is to be built as per the internationally recognized classification society marine standard for seagoing ships, and a certificate in this regard is to be provided by the manufacturer.

b. **Make**. To be mentioned.

c. **Location**. To be mentioned (The main switchboard is preferable in the MCR. The Secondary switchboard is preferable in the DG Room.)

d. **Dimension**. The switchboard's dimensions should ensure sufficient space on all sides for easy maintenance.

e. **Construction.**

(1) Switchboards are to be of drip-proof design, closed from back and other sides, and should have watertight protection on the top. It shall be of box frame construction and shall have hinged front instrument panels that can be opened without disturbing the meters, pilot lamps, etc., mounted on them.

(2) The dead front type switch board is to be insulated with all necessary devices mounted on it, i.e., breakers, switches, instruments, synchronizing devices for paralleling, fuses, bus-bars, terminals, cable glands, etc.

(3) All devices are to be accessible from the front. Breakers shall be arranged so that they can be easily operated and removed for maintenance.

(4) All monitors and controls are to be marked with nameplates (in English). Handrails covered with insulating material are to be provided.

(5) Switchboard configuration is to be drawn on the front panel of the switchboard for easy understanding by the operators. A rubber mat is to be fitted at the front of the main switchboard.

(6) The switchboard is to be fitted with earthing test facilities.

(7) Copper busbars are to have adequate current-carrying capacity for continuous operation and withstand mechanical stress from short-circuit currents. Use high-quality copper, color-coded Red, Yellow, and Blue. Busbar supports shall be moisture-resistant

f. **Panel Arrangement**.

(1) Each switchboard will mainly have two sections. The switchboard is to consist of the following panels:

(a) Two Alternator Panels (port and starboard).

(b) One Synchronizing Panel.

(c) Generator's Power Feeder Panels.

(d) 220 V single-phase Feeder Panel.

(e) 115 V single-phase Feeder Panel.

(f) 24V DC Feeder Panel.

(g) Armament Power Supply Feeder Panel.

(h) Torpedo System Power Supply Feeder Panel for ASW LPCs.

(j) Missile System Power Supply Feeder Panel for ASuW LPCs.

(2) **Alternator Panel**. These panels are to be fitted with the alternators' control and monitoring systems. Each Alternator Panel is to be equipped with the following

(a) Main supply breaker (air circuit breaker) of appropriate capacity.

(b) Ammeter with changeover switch (for monitoring all 3 phases).

(c) Voltmeter with a changeover switch (for monitoring all 3 phases and shore voltage).

(d) Frequency meter.

(e) RPM meter.

(f) KW meter.

(g) Green lamp for main supply breaker 'ON'.

(h) Space heater Auto ON/ OFF switch.

(j) Orange lamp for space heater 'ON'

(k) Hand voltage regulator.

(l) Hand frequency control.

(m) Reverse power and over current relay.

(n) Green lamp for generator running.

(p) Pilot lamp for each generator.

(q) Earth/ground detection means

(r) Power Factor Meter.

(s) Winding Temperature Indicator.

(3) **Synchronizing Panel**. The synchronizing panel is to be divided into control and indication sections for parallel operation. Equip both sections with the necessary meters, regulators, switches, breakers, indicator lights, and synchronizing devices.

(4) **Generator's Power Feeder Panel (refer to Article 0702)**. Each alternator control and monitoring section will have a feeder panel. Each generator's power feeder panel (refer to Article 0702) is to be equipped at least with the following devices:

(a) One Insulation resistance meter for each panel with an audible alarm.
(b) Required number of MCCBs.

(5) **220V Single Phase Feeder Panel**. One in number feeder panel is to be supplied for the distribution of 220V single-phase AC. 220V feeder panel is to be fed from Generator voltage (415 ±10%, 50Hz, 3 Phase) / 220V transformer for subsequent distribution to 220V services of the LPCs. The 220V feeder panel is to be fitted with the following:

(a) Ammeter and Voltmeter.
(b) Transformer 'ON' indication system.
(c) Insulation resistance meter
(d) Earth test indication system with audible alarm.
(e) MCCB for power transformer.
(f) Required number of feeder breakers of appropriate ratings.

(6) **115 V Single Phase Feeder Panel**. One in number Feeder Panel is to be supplied for the distribution of an115V single-phase AC supply. The 115V feeder panel is to be fed from the Generator voltage (415 ±10%, 50Hz, 3 Phase) via an appropriate-capacity 115V transformer. The feeder panel is to be fitted with the following:

(a) Ammeter and Voltmeter.
(b) Transformer 'ON 'indication system.
(c) Insulation resistance meter.
(d) Earth test indication system with audible alarm.
(e) MCCB for power transformer.
(f) Required number of feeder breakers of appropriate ratings.

(7) **24V DC Feeder Panel.** One in number Feeder Panel is to be supplied for the distribution of 24 V DC. An Adequate number of rectifier generators, voltage (415 ±10%, 50Hz, 3 Phase)/24 V DC of appropriate capacity are to be

provided. Rectifiers will be fed from the Generator voltage (refer to Article 0702) power distribution panels. The 24V DC Feeder Panel primarily supplies and distributes DC power to various services. In the absence of primary supply, secondary supply will be provided to important services by automatic changeover switches. These automatic changeover switches are to be installed either on the switchboard or at another suitable location near it. However, this 24 DC Feeder panel is to have at least the following facilities:

(a) **Monitors**.

i. Voltmeter and Ammeter.

ii. Rectifier 'ON' indication system.

iii. Battery supply 'ON' indication system.

(b) **Control.**

i. Rectifier ON/ OFF.

ii. Battery supply ON/ OFF.

iii. Rectifier/Battery power selection control.

(c) **Distribution**

i. MCCB for rectifier.

ii. Required number of feeder breakers/ fuses for consumer services.

(8) **Feeder Panel for Armaments and Missile/Torpedo Power Supply**. Provide sufficient feeder panels of the required voltage and capacity for torpedo and armament power supply. Feed these panels from the generator's feeder panel, with all necessary arrangements as appropriate. This Feeder Panel is to have the following facilities:

(a) **Monitoring**

i. Voltmeter.

ii. Ammeter.

iii. Rectifier "ON" indication light.

(b) **Control**

i. Rectifier ON/ OFF.

ii. Rectifier selection control.

(c) **Distribution**. Circuit breaker/ switch of required capacity for armament.

g. **Alternator Circuit Breaker**. An appropriate-capacity circuit breaker shall protect the alternator.

h. **Busbar Linking Switch**. A bus bar linking the switch/breaker of appropriate capacity is to be provided to connect or disconnect the two sections of the switchboard easily.

j. **Circuit Breakers for Shore Connection**. Provide an air circuit breaker of suitable capacity in the switchboard, with an interlock to prevent alternators from running on shore supply.

k. **Safety Devices**. Safety devices are to be arranged as under:

(1) **For Alternator Supply Breakers**. The Following Safety devices may be incorporated with each of the supply breakers:

(a) Provide a trip release with appropriately selected short and long delay settings

(b) Reverse power release.

(c) Under-voltage release.

(d) Over current release.

(e) Interrupting capacity against short circuit release.

(2) **Safety Devices in Other Breakers**. The following safety devices are to be provided for all the other breakers:

(a) Instantaneous trip release on each pole for short circuit protection.

(b) Delay trip release on each pole for overload protection.

l. **Interlocking Arrangements**. An Interlocking arrangement with the alternators is to be provided so that shore power cannot be fed to busbars when any of the alternators is in operation.

m. **Meters**. All meters on the main switchboard front panel are to be flush-mounted, square marine-type, except for synchronizing frequency meters, which shall be reed-type—meter accuracy to be within ±1.5% of full-scale. Voltmeter and ammeter ranges to be at least 20% and 30% above rated voltage and current, respectively. Wattmeter range to cover 15% reverse power to 130% of the rated wattage. Frequency meter range 45–65 Hz, with rated value marked in red. Calibrate all meters before final delivery to BN.

n. **Labeling**. Clearly label all circuit breakers, control switches, instruments, indicator lights, and terminal blocks to indicate their purpose and function. Fuse labels to include fuse ratings. Feeder nameplates has to show designation, application, and rated current. Mark each circuit on the switchboard with a distinct label.

0709. **Power Distribution System**.

a. **Configuration**. The power distribution system is to be radial, with a floated neutral, three-wire, three-phase supply onboard the LPCs. In general, voltage, frequency, and phase are to be as follows:

(1)	Generator	415 ±10%, 50Hz, 3 Phase. Refer to Article 0702 and 0707
(2)	Main Power System	415 ±10%, 50Hz, 3 Phase. Refer to Article 0702
(3)	Lighting system, domestic control system, etc.	220 V AC, 1 Phases
(4)	Emergency lighting	24 V DC
(5)	Pumps, Capstan, Steering system, and other Motors	Generator Voltage (415 ±10%, 50Hz, 3 Phase)
(6)	Navigation and Communication equipment	115 V AC/220 V AC/24 V DC
(7)	Interior communication and instrumentation	115 V AC, 1 Ph/ 220 V AC, 1 Ph/24 V DC
(8)	Armament	415 ±10%, 50Hz, 3 Phase. Refer to Article 0702, section IX and section XI.

b. **Wiring**. The wiring is to be a three-wire insulated system for an AC three-phase circuit and a two-wire insulated system for an AC single-phase circuit and a DC circuit.

0710. **Distribution Panel/ Switch Box**. The required number of distribution panels is to be fitted. The following factors are to be considered:

a. Non-water-tight (IP 23) and wall mounting type for accommodation space.

b. Totally enclosed (IP 44) and wall mounting type for engine room and IP 56 for weather deck spaces.

c. Provide distribution panels at suitable locations to supply power to various consumers, including power, lighting, communication, torpedo, and armament systems.

d. Provide nameplates on the inner side of the distribution panel front doors indicating the name of each circuit.

e. Each distribution panel to have a nameplate on the outer door showing panel name, identification number, and power source. Inside the panel, each circuit breaker has nameplates indicating circuit number, service, breaker frame size and rating.

f. Each distribution panel is to have voltage measuring outlets without opening the cover of the circuit breakers/ busbars.

g. Each distribution panel to include at least 20% spare MCCBs/fuses for future expansion. Panels with fewer than 5 MCCBs/fuses to have at least one spare.

0711. **Conversion Machinery**.

a. **Transformers**. The required numbers of 415±10%V/115V, 50Hz, 3 Phase and 415±10%V/220V, 50Hz, 3 Phase transformers (air-cooled, dry-type, class F, of appropriate capacity) are to be provided. The maximum ship load should not exceed 70% of transformer capacity, and transformer capacity should be considered with at least a 30% growth potential for future expansion.

b. **Rectifiers (24 V DC)**. Required numbers of 24 V DC rectifiers of appropriate capacity are to be provided. The maximum ship's load should not exceed 70% of the rectifier's capacity, and the rectifier's capacity should be sized to allow at least 30% growth potential for future expansion.

0712. **Shore Supply Arrangement**.

a. **Shore Supply Connection Box**. One shore power connection box rated at 415±10%V, 3-phase, 50 Hz, and of appropriate ampere ratings is to be fitted at a suitable place to take power from the shore. However, after receipt of the load analysis, BN will determine the exact capacity. It should be fitted with a phase sequence indicator, panel (alive) indicator lamps, and one circuit breaker with overload and short circuit protection.

b. **Shore Supply Cable**. One flexible shore supply rubber-insulated connection cable, 200 m in length and of appropriate capacity, wound on an aluminum roller, is to be provided. However, after receipt of the load analysis, BN will determine the exact capacity. The outer end of the cable is to be fitted with lugs to facilitate easy connection to the shore supply feeder point.

0713. **Ship's Along Side Feeder Breaker**. A feeder breaker of 150 A, generator voltage (415±10%V, 3-phase, 50 Hz), and 3-phase is to be provided in the shore connection box to supply power to other ships alongside.

0714. **Battery Switchboard**. One battery switchboard is to be provided for charging and discharging of battery. This switchboard is supplying DC power to navigation lights, the general alarm system, the fire monitoring system, propulsion control circuits, the gyro compass, internal communication, radio equipment, etc., as an emergency supply. In the absence of the main power supply, an emergency supply is to be fed to important services by automatic changeover switches of appropriate capacity. The required number of changeover switches must be located either on the battery switchboard or at a suitable location near it. The switchboard is to be dead-front and self-supporting. The board is to be fitted with the following instruments and devices:

a. DC voltmeter with a selector switch.

b. DC ammeter for discharging current.

c. DC ammeter for charging current.

d. Source pilot lamp.

e. Insulation resistance meter with earth indicating lamp.

f. Change over switch (quick charging or trickle charging).

g. Necessary number of miniature circuit breakers or fuses.

0715. **Cables**.

a. Cables installed throughout the LPCs are to be approved by a classification society. It is to be of appropriate grade insulation to meet the voltage to which they are subjected.

b. Cables supplying one or more loads shall have a continuous current capacity as per the standard of Classification Society.

c. The voltage drop on all power and lighting circuits from main busbars to the final point shall be as per the standard of Classification Society.

d. Cables to be low-smoke, fire-retardant type, approved by an internationally recognized classification society.

e. Shock, vibration, temperature, relative humidity, and other conditions of the cables are to be approved by an internationally recognized Classification Society.

f. All cables, including power cables, shall have outer shielding.

g. All cables, except power cables up to three cores, to include 20% spare cores. Signal cables with up to five cores to have at least one spare core.

h. Insulation of cables throughout the vessel shall be as per the standard of an internationally recognized classification society.

j. **Cable Installation**. Cables are to be laid/ installed in accordance with internationally recognized classification society requirements.

0716. **Motors and Starters**.

a. **Motors**. Motors are to be of squirrel cage induction type of International Electro-technical Commission (IEC) standard frame, designed for AC 415±10%V, 3 Phase, 50 Hz, except for small motors, which may be AC 220V/115V single phase. Motors to be rated for continuous full-load duty, except for steering gear, deck machinery, and similar applications. The following factors are to be considered:

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

(2) **Space Heater**. Large motors shall be exposed to the weather deck; steering gear motors and essential motors may be provided with space heaters.

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

(4) **Insulation**. In general, motors shall be treated with insulating varnish resistant to oil and water—motors to be designed and constructed with insulation class H.

(5) The detailed specifications of all motors used for different purposes of the LPC are to be supplied in the offer.

b. **Starters**. A starter for each piece of equipment/machinery is required; no group starter is acceptable. Starters for non-essential motors of 1 HP or less may be manually operated using MCCBs. In general, starters should be of direct-on-line type for small motors (rated below 3 kW). All motors above 3 kW are to be provided with a star-delta starting type starter. The starter circuit diagram is to be engraved on the inside of the starter box. The following protections are to be provided in motor starters:

(1) **Under Voltage**. Starters, except for non-essential motors rated 0.5 kW or less, must be provided with under-voltage protection or a release feature.

(2) **Over Current Protection**. Each starter is to be equipped with a thermal-type over current protection relay. The relay shall be of manual-reset, with the reset switch located inside the starter cabinet.

(3) **Indicator**. Power and running indication lights are preferable on the starter.

0717. **Lighting**.

a. **General Lighting**.

(1) The lighting is to be divided into the normal 220 V lighting and the 24 V DC emergency lighting.

(2) The LPC is to be illuminated with fluorescent lamps/ LED lamps as much as possible. Incandescent lamps with guards are to be fitted in machinery spaces as necessary.

(3) Weather deck and area around the bridge are to be illuminated with incandescent light and floodlights according to the warship standard.

(4) In general, the type of lighting fixture and fittings is to be as follows, depending upon their locations:

(a)	Watertight type	Spaces exposed to the weather, machinery spaces, refrigerating plant room, steering gear room, galley, pantry, deck, stores, etc.
(b)	Non-watertight type	Living quarters, wheelhouse, engine control room, equipment spaces, etc.
(c)	Explosion-proof type	Magazine room, paint room, battery room, ammunition handling/ready-use space, etc.

(5) Lighting fixtures exposed to mechanical damage are to be protected with guards for incandescent lamps and a polycarbonate globe for fluorescent/ LED lamps.

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

(7) All lighting fixtures are to be of Warship Standard.

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

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

b. **Interior Lights**.

(1) The interior lighting is to be designed for operation on 220 V. The interior of the vessel is to be adequately lit with marine-grade fluorescent/LED lights.

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

(3) All chart table lights are to be provided with a chart light with a long folding arm, red lens and dimmer.

(4) Ops room and communication room lighting is to have a dimmer facility.

c. **Magazine Lighting**. All electrical fittings in the magazine are to be intrinsically safe and watertight to protect them from water spray. Special fireproof shielded cables, explosion-proof lights, and fittings are to be fitted inside the magazine. All cables in the magazine must be encased in metal conduct. Switches are to be mounted outside the magazine access. Magazine lighting switches are to be painted red.

d. **Exterior Lighting**. Details of all the exterior lights, socket outlets, etc., in the aft and fore deck and on top of the bridge are to be specified.

e. **Emergency Lighting - Automatic Emergency Lanterns**. A sufficient number of automatic emergency lanterns is to be provided in every compartment, passage, and internal area to meet the lighting requirement in case of power failure, to show the way out to the weather deck. They shall be wired in conjunction with the normal lighting supply system for automatic charging with the normal ship's supply, and they will automatically switch on when the normal supply fails.

f. **Navigation Lights**.

(1) Electric navigation lights are to be provided as per the international maritime regulation and warship (naval) standard. The navigation lighting is powered by 24V, preferably with a battery backup.

(2) Other sources for navigation lighting are to be mentioned.

(3) A control panel for navigation lighting fitted with navigation light 'ON' indications, visual and audible alarms are to be installed in the bridge.

(4) The navigation lights are to be as IMO / warship standard as applicable.

g. **Signal Lights**. Electric signal lights are to be in accordance with the International Maritime Regulations and the warship standard. They are to be located in the appropriate location in the LPCs as per the warship (naval) standard. All signal lights are to be connected to the signal light control panel installed in the bridge. Required number of signal lights/search light/Morse signal lights are to the provided as per IMO/ warship standard.

h. **Flood Lights**. The following watertight floodlights are to be provided:

(1) Four portable incandescent floodlights (each 300W) are to be provided.

(2) Two fixed flood lights of appropriate capacity watt for the boat area and two appropriate capacity sealed beam type (24 V DC) boat lowering lights.

(3) Two in number of appropriate capacity floodlights are to be installed in front of the Bridge to illuminate fox'l area and two at the aft side of the ship to illuminate the aft area of the ship.

j. **Search Lights**. Two 500W incandescent signal search lights with swivel mounting are to be provided at a suitable location. These should be remotely controlled from the bridge.

k. **Portable Lights**. Following lights of 220V AC, 50 Hz are to be provided:

(1) 4 x 100W watertight type with 15 m cord and plug.

(2) 6 x 100W non-watertight type with protection guard, 15 m cord and plug

(3) 10 x 60W working light with one side cover, 15m cord and plug.

l. **Spot Lights**. An appropriate number of spotlights with red lenses and dimmers are to be provided for spot illumination of ops room equipment, displays, repeaters, Captain's chair at the bridge and ops room etc.

m. **Red Lighting**. Red lighting (220V, AC, 20W fluorescent/LED) is to be fitted in spaces with external exposure due to personnel movement onboard the LPC. The intensity of the light is to be such that a minimum of illumination is maintained for the movement of the personnel.

n. **Darken Ship Illumination**. Incorporate darkened ship facilities to ensure that no internal lighting is visible externally, even when doors and hatches are open. This facility shall be controlled by several dark-switch boxes and door limit switches at

suitable positions. A single switch to interrupt the supply of all non-essential external lighting in the darkened ship's state shall be conveniently located on the bridge.

p. **Dressing Light/ Illumination Circuit**. Watertight ceremonial dressing lighting circuits of required length are to be provided to illuminate the ship's side, superstructure, and fore to aft over the mast. The required number of watertight power receptacles with switches must be provided on the main superstructure to supply electric power to the dressing light.

0718. **Navigation Auxiliary Equipment**.

a. **Window Wipers**. The required number of electrically operated parallel window wipers must be fitted to the front windows in the Bridge. Arrangement for fresh water supply is to be provided for this purpose.

b. **Clear View Screen**. Two in number clear-view screens are to be fitted on both sides of the front window.

0719. **Fans**.

a. Sufficient numbers of swivel-type oscillating fans are to be fitted in the bridge, accommodation spaces, and other spaces as required.

e. The number and specifications of fans are to be mentioned.

0720 **Power Receptacles**. The following compartments are to be provided with power receptacles:

Ser	Compartments	Power
a.	All equipment compartments, bridge, Ops room, machinery space, etc.	115V,50 Hz,1 phase
b.	All accommodation and recreation space, wardroom, equipment bridge, galley, etc.	220V, 50 Hz,1 phase
c.	At least 3 locations on the main deck for the submersible pump.	(415±10%V,50 Hz 3Ph)
d.	All equipment compartments, bridge, Ops room, machinery space, etc.	24 V DC
e.	All equipment related to ASW weaponry System and Armament supply.	Refer to Article 0702, section IX and section XI.

0721 **Ship's Alarm System**.

a. **General Alarm**. The general alarm is to be audible in all spaces except tanks. The alarm is to be operated on 24V DC. The following are to be provided:

(1) Three master switches (one in the bridge, one in the ops room, and one in a suitable position where the gangway will be placed).

(2) Bells and red rotating lamps in engine room/ machinery spaces.

(3) Bells with and without red lamps as required at different places on board LPC.

b. **Fire Detection System**. An effective fire detection system is to be provided in the Magazine and other places as necessary for the LPCs. Details of the fire detection system are to be given in the offer.

c. **Action Alarm**. In the broadcast system, provision of an action alarm is to be incorporated, and its tone is to be sharp to meet the naval requirement.

d. **Man Overboard/Lifebuoy alarm.** To provide immediate warning and response when a person accidentally over boarded.

0722. **Ship's Internal Communication System**. The following types of internal communication means are to be provided:

a. **Auto Telephone System**. One automatic exchange telephone system with 4+24 lines (with an announcing function via public address from the telephone) is to be installed. It will be operated on the ship's 115 V/220 V, 50 Hz, single-phase supply or on a 24 V DC supply in an emergency. The required number of wall- or desk-mounted telephones is to be fitted in cabins, important office/maintenance spaces, gangways, etc. A telephone cable of at least 10 pairs, each 100 meters in length, is to be provided. Provision is to be kept for connecting it to the shore telephone connections.

b. **Intercom System**. In addition to the auto telephone system, warship-standard following intercoms are to be installed. All intercom amplifiers must be identical so they are interchangeable. In addition, one spare amplifier is to be provided in the intercom rack.

(1) **Machinery Space Intercom**. It will be used to maintain voice communication in noisy places between MCR, Engine Room, Machinery Spaces, Bridge, and Emergency Conning Position.

(2) **Combat Intercom**. It will be used to control guns, weapons, sensors, and associated control systems from the bridge, ops room, gun mountings, etc., as required.

(3) **Conning Intercom**. It will be used to maintain communication between the bridge, CO's Cabin, MCR, Engine Room and Propulsion machinery compartment.

c. **Voice Pipes**. Internal voice pipes are to be fitted as required.

d. **Internet Connection**. Suitable cables (Preferably Fiber-Optic) are to be laid in required spaces, such as the wardroom, general accommodation, offices, and officers' cabins, to provide shore-to-ship internet connectivity with LAN facilities.

0723. **General Broadcast System**. A General Broadcast System with appropriate output power is to be provided to broadcast alarms, announcements, and entertainment programs reliably. The main unit is to consist of 03 in no of identical amplifiers (120W,180W,160W) as required, with one spare amplifier, radio tuner, DVD/ VCD/ CD/ MP3 player including alarm and announcement initiation abilities ofapprox100 in no ranging from (5W to 30W) speakers spread over the LPC. The broadcast system is to be divided into several announcement groups. The priority of the broadcast signals will be as follows:

a. Alarm signals shall have the highest priority and are to be broadcast from all speaker groups.

b. General announcement shall have the next higher priority.

c. The control panel is to be fitted with a microphone and monitor speaker, and be able to control in the following spaces:

(1) Bridge top (watertight horn speaker).

(2) Weather deck (watertight horn speaker).

(3) Cabins and passages (Box speaker).

(4) Engine room and machinery room (horn speaker).

(5) All other compartments/spaces as necessary.

d. All cabins, mess, living spaces, and wardroom are to be provided with a receptacle for connecting TV and Radio with national TV, shore Cable TV, and Radio signal (FM, MW, and SW).

e. PA System with portable amplifier to be included for daily indoor and outdoor activities.

f. A complete set of mixer unit (Nine or sixteen channels) with accessories to be included for program arrangement.

g. A complete set of mobile network boosters and repeaters to be installed for a smooth network throughout the ship.

0724. **Central TV Receiving System**. A central TV receiving system is to be provided for the ship's TVs. A shore connection point is to be provided for connecting shore Cable TV to the ship's recreation system.

0725. **Bonding Strip**. Provide appropriate flexible bonding strips on all ladders, stanchions, and structures on the upper deck that are not permanently connected to the ship's hull to reduce EMI.

0726. **Miscellaneous Electrical Equipment**. The following equipment is to be provided:

a. Two portable transistorized megaphones.

b. One portable switchboard with fuses and terminals.

c. Two in number portable blowers.

d. One DC emergency switchboard.

e. Ten in number electric irons.

f. Ten in number iron board/stand.

g. One in number Aldis lamp or Portable Signal Lamp.

h. Smart TV (minimum 40 inch) and Blu-Ray disk player for CO's cabin.

j. Smart 3D TV (minimum 40 inch), a music system (with speaker and karaoke facilities), and a 3D Blu-Ray disk player for the Wardroom.

k. LED TV (minimum 40 inch) and Blu-Ray disk player for senior ratings dining space.

l. LED TV (minimum 40 inch) and Blu-Ray disk player for junior ratings dining space.

m. Any other electrical items considered essential in LPC.

n. A suitable home theater for the wardroom with associated speakers.

p. Latest version of PlayStation & Xbox with controller and VR Headsets.

SECTION VIII

NAVIGATIONAL EQUIPMENT/ AIDS

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

a. 1 X Navigational Radar.

b. 2 X GPS.

c. 2 X Gyro Compass (INS).

d. 1 X Echo Sounder.

e. 1 X W-AIS.

f. 1 X Speed Log enabling to operation at sea.

g. Integrated Electronic Chart covering the Bay of Bengal and adjacent areas.

h. Other standard Nav-Aids enabling operation at sea.

0802. **Gyro Compass**. One Gyro Compass of standardized Brand and Model (Sperry Marine, SAFRON, GEM Electronica, Anschuz, and Exail Group) and one high accuracy INS gyro (Brand, Model and Country of Origin and manufacturer is to be mentioned) are to be supplied. The proposed gyro should provide extremely precise rotational rate information and a quick settling time. The gyro platform is to be accurately mechanically aligned to meet the manufacturer's installation specification. It will provide TRUE NORTH in relation to the ship's heading. It is to be interfaced through a Data Distribution Unit (DDU) with CMS, Nav RADAR and other equipment as required. The individual compass is to be supplied with at least the following units:

a. One Gyro master unit (in addition to the one for the fire control system)

b. 5 x Ship's digital heading marker indicator (ops room, bridge, Steering Gear Room, MCR, Captain Cabin).

c. 3 x bearing repeaters (with Azimuth Circle) in bridge wings and center.

d. One DDU with two inputs (one from this navigation gyro and the other from FC gyro). The DDU should have both automatic and manual selection facilities for inputs. The DDU output will be sent to the various units listed in this technical specification.

e. The gyro shall have the facility to interface with the installed other sensors and weapons on board the ship.

f. Adequate number of ports for supply to the ship's Weapons / Systems and future development.

0803. **Magnetic Compass**. The LPC is to be fitted with one magnetic compass located on the bridge/bridge top. There should be at least one repeater at the bridge &one Digital Repeater for the Steering Compartment. A telescope mirror is also to be fitted in the bridge position.

0804. **Echo Sounder**. A suitable digital marine echo sounder (Display unit fitted in bridge)and 2x Digital repeater (Fitted in Bridge Control Console & MCR) capable of measuring up to 500m (minimum) shall be installed in each LPC. The depth alarm setting should be available.

0805. **Speed Log**. The LPC is to be fitted with one electromagnetic log. The master speed unit is to be installed on the bridge. The log is to be fitted with at least 3 repeaters. It should be capable of interfacing with the Radars, Gyro, FCS, and ASW System, as required.

0806. **Horns/ Sirens**. The LPCs are to be provided with Air Horns/ Sirens for navigational purposes to produce a clear, sharp tone of consistent intensity, including appropriate control devices to generate the required sound signals. Fitted horn/ siren should operate under all weather conditions in compliance with COLREGS 1972.

0807. **Navigational Radar**. One suitable navigational radar (Solid State) is to be installed as per the BN's standardized Brand/Model (Hensoldt, GEM Electronica, Sperry Marine, Terma, and Aselsan) and interfaced with the CMS, Gyrocompass, and W-AIS. GPS, Speed log etc. This radar will be fitted with at least two Colour Tactical Display Units (one at the bridge and the other one in the ops room/CIC).Bidder shall comprise of the followings (but not limited to):

a. System Composition.

(1) 1 x Navigational Radar (forward) with associate accessories.

(2) 2 X Display & Control Console (DCC) with associate accessories.

(3) 1 x Radar Inter-Switch Unit (Radar video of each radar can be displayed or interchanged at each console using this Inter-switch unit i.e. single display console should have option to display both videos according to the selection by operator and two different videos can be displayed in different consoles at the same time) and other associate accessories.

(4) 1 x Set of Power Supply Unit.

(5) 1x Radar Video Interface Board to integrate with ECDIS,CMS, all Gyrocompass, W-AIS. GPS, Speed log etc.

(6) Associated Hardware, Electronics and Software for integration/ interface.

b. **System Architecture**. A block diagram of system configuration showing interface/ integration options is to be provided by the bidder with the offer for assessment.

0808. **GPS**. Two GPS units from an internationally renowned company are to be installed for continuous position and time reference data. The antennas are to be installed at a suitable location, and the main unit is to be installed on the bridge. Fitted GPS should be interfaced with the required sensors and systems on board in each LPC.

0809. **Chart Table**. A chart table is to be provided on the bridge at a suitable location, equipped with a dimmable lamp and a curtain for chart work. Include drawers for storing ready-to-use charts.

0810. **Helmsman Rest**. One helmsman's rest is to be provided for the Steering Console.

0811. **Barometer**. Two Aneroid Barometers are to be provided and mounted in the bridge and ops room.

0812. **Barograph**. One in number barograph is to be provided and fitted in the Captain's Cabin.

0813. **Binoculars**. Six in number prismatic binoculars with covers and one in number Night Vision Binocular are to be provided.

0814. **Chronometers and Watches**. Chronometers and Watches are to be provided on the Bridge.

0815. **Anemometer**. The LPC is to be fitted with at least one Anemometer to indicate the relative wind speed and direction. The wind transmitter will be located on the mast, and the remote indicators will be in the ops room and the bridge. It will be interfaced with the required sensors and systems on board in each LPC.

0816. **Navigation Lights**. All lights are to be fitted onboard as per the relevant International Rules for Preventing Collision at Sea. The lights will include (but not limited to) one masthead light, two side lights, one stern light, one towing light, one wake light, two anchor lights, "Not Under Command light (fixed or portable), towing light, 'Restricted in Her Ability to Maneuver' light, RAS light etc.

0817. **Additional Navigational Equipment/ Item**. The following navigational equipment/items are to be provided: additional

a. 3 x steering repeater. 2 for bridge (one will be a desk mount type for helmsman on bridge console) and 1 for steering compartment.

b. Fog Horn (automatic) - one set.

c. Ship's Bell - one set

d. Deck Watch - one set
e. Clinometer - 3 (Bridge, Ops Room and MCR).
f. Marine Ship's Clock - 10 in No (position to be mentioned later)
g. Azimuth Circle - 3 in No (Bridge and both Wings).
h. Dry and Wet Thermometer - Two sets.
j. Max-Min Thermometer - 4 in No.
k. One rear-view camera with monitor at the bridge.
l. One maneuvering board with 1 set of miniature ship models.
m. One Officer of the Watch (OOW) state board.

0818. **Necessary Drawings**. Provide all necessary drawings, circuit diagrams, fault-finding diagrams, and related documentation for all electrical and electronic equipment supplied.

0819. **Dimming of Lights**. Various switches, control panels, and displays at the bridge will have dimming facilities for night navigation.

SECTION IX

SENSORS

0901. **General**. All sensors of the LPC are to be the latest version from an internationally reputed manufacturer. Necessary drawings, circuit diagrams, fault-finding diagrams, etc., for all the sensors are to be provided with the items. It should also be interfaced as required.

0902. **Navigational Radar**. One Navigational Radar, as mentioned in para 0807.

0903. **Search and Surveillance Radar**. One Air and Surface Search Radar, compatible with CMS is to be provided. Radar must detect and determine accurate ranges, bearings, and other essential data for surface targets, including low-flying aircraft, and provide this data to the fire control system for precise firing solutions. It must maintain 360-degree surveillance of all targets within the radar antenna's line of sight. The technical specification of the proposed Air and Surface search Radar is as follows:

a. **Technical Parameters**.

Ser	Description	Remarks
General Description		
(1)	Type	Air & Surface Surveillance Radar
(2)	Brand & Model	To be mentioned
(3)	Country of Origin & Manufacture	To be mentioned
(4)	Year of Manufacturing	2025 or later
(5)	Major Features	Surface & air surveillance, and send the target to the ship command system in real time.
(6)	Maximum Range	Air target Not less than 60 Km for target with RCS 10m² (To be mentioned). Surface- up to the Radar horizon.
(7)	Frequency Range	To be mentioned (preferably S/X Band)
(8)	Ingress Protection (IP)	Outdoor Unit: IP 65 or better (To be mentioned) Indoor Unit: IP 54 or better (To be mentioned)
(9)	Data integration	To be mentioned
(10)	Antenna Coverage	To be mentioned (Preferably Azimuth 360°, Elevation 0–30°)
(11)	Bearing Accuracy & Quantization	To be mentioned
(12)	Simultaneous Targets	To be mentioned(Preferably 64 targets)
(13)	Antenna Polarization	To be mentioned
(14)	Sensitivity	To be mentioned

Antenna & Transmitter Unit		
(15)	Antenna Type	To be mentioned
(16)	Antenna Stabilization	To be mentioned
(17)	Transmitter Type	Solid-state
(18)	Modulation Type	To be mentioned
(19)	Beam width	To be mentioned
Cooling unit		
(20)	Type / Refrigerant	To be mentioned (Preferably Air/Fluid Exchanging System)
(21)	Cooling Capacity	To be mentioned
Other Sub Unit		
(24)	Technical Details of other Sub Unit (if any)	To be mentioned

0904. **Electro-Optical Tracking System**. Suitable Electro-optical(EO) Tracking system with IR and a laser rangefinder is to be installed. The control console (with display) will be installed in the Ops Room/CIC and interfaced with CMS and associated sensors/equipment/weapons. The technical specification of the proposed electro-optic system and laser range finder is as follows:

a. **Technical Parameters**.

Ser	Description	Remarks
General Description		
(1)	Type	Tracking surface & air targets
(2)	Brand & Model	To be mentioned
(3)	Country of Origin & Manufacture	To be mentioned
(4)	Year of Manufacturing	2025 or later
(5)	Major Features	High precision tracking, missile guidance, and fire control solution
(6)	Ingress Protection (IP)	Outdoor Unit: IP 65 or better (To be mentioned) Indoor Unit: IP 54 or better (To be mentioned)
(7)	Maximum Range	TV Camera 12Km(Minimum) LASER 5 Km(Minimum) IR 10 Km(Minimum)
(8)	Operational Target	Surface vessels, low-flying aircraft & missiles
(9)	Data Integration	To be mentioned
(10)	Bearing Accuracy & Quantization	To be mentioned
(11)	BITE Test Facility	Integrated diagnostics
(12)	laser range finder	To be mentioned
(13)	Electro-optic system	To be mentioned
Cooling Unit		
(14)	Type / Refrigerant	To be mentioned (Preferably Air/Fluid Exchanging System)
(15)	Cooling Capacity	To be mentioned

Other Sub Unit		
(16)	Technical Details of other Sub Unit (if any)	To be mentioned

0905. **SONAR for ASW LPC**. The LPC is to be fitted with hull-mounted active search-and-attack sonar with its associated system. Provide a multi-color sonar display with active and passive modes for underwater surveillance. It must detect, track, and classify targets such as submarines, surface ships, and torpedoes. The sonar shall be compatible with the ship's structure and weapon systems. Include detailed specifications. The technical specification of the proposed SONAR for ASW LPCs is as follows:

a. **Technical Parameters**.

Ser	Description	Remarks
General Description		
(1)	Type	Hull-mounted SONAR
(2)	Brand & Model	To be mentioned
(3)	Country of Origin & Manufacture	To be mentioned
(4)	Year of Manufacturing	2025 or later
(5)	Major Features	a. Simultaneous active, passive mode & Active target classification. b. MCC operational mode for maintenance of close contact c. MAS operational mode for moored mine detection. d. TOD operational mode for active torpedo detection.
(6)	Operating Range	To be mentioned.(Min 8000 mtr)
(7)	Simultaneous Target Tracking Capacity	Minimum 3 (active mode) & 1 (passive mode) To be mentioned
(8)	Frequency Range	To be mentioned(Preferably MF/HF)
(9)	Bearing Accuracy	To be mentioned (Preferably ±1.5°)
(10)	Range Accuracy	To be mentioned (Preferably1% +50 m (RMS) of the target range)
(11)	Sensitivity	Sensitivity of single Transducer Unit: To be mentioned (Preferably-160 dB re 1 µPa)
(12)	Data Interface	a. Open and standard protocol for manual data sharing. b. Any other (To be mentioned)
(13)	Transducer Unit Type	To be mentioned (Preferably Hull-mounted cylindrical Array)
(14)	Multi Operator Console	To be mentioned (Preferably 3)

Other Sub Unit		
(15)	Technical Details of other Sub Unit (if any)	To be mentioned

0906. **Underwater Telephone and Bathythermograph for ASW LPC**. An underwater telephone and bathythermograph system should be supplied, integrated with SONAR system.

0907. **Standalone ASW Combat Management System for ASW LPC**. One Standalone ASW Combat Management System compatible with onboard SONAR Torpedo, Underwater telephone and Chaff Launcher are to be supplied. The control console (with display) will be installed in the Ops Room/CIC and will be interfaced with associated sensors/equipment/ weapons for accurate firing.

0908. **State Boards**. Various state boards, information boards, and plot tables are to be arranged in the ops room/CIC to meet BN requirements.

SECTION X

COMMUNICATION AND EW EQUIPMENT

1001. **External Communication Equipment**. The following external communication equipment for ship-ship, ship-shore, and ship-aircraft communication onboard each LPC, which will be incorporated with the Integrated Communication System (ICS), except for walkie-talkie and Tx/ Rx marine VHF, is to be installed onboard each LPC:

a. 1 X HF Tx/Rx 400-500W(latest model from CONDAN/ ROHDE & SCHWARZ/ SUNAIR and ICS compatible), with voice encryption and data modem (Covering Military HF frequency).

b. 1 X HF Tx/Rx 100-150W (latest model from CONDAN/ ROHDE & SCHWARZ/ SUNAIR and ICS compatible) with voice encryption and data modem.

c. 1 X VHF/ UHF Tx/ Rx Wide Band (latest model from Park Air/ ROHDE & SCHWARZ/ SUNAIR and ICS compatible) with remote link.

d. 1 X VHF/ UHF Tx/ Rx Narrow Band (latest model from ICOM/ ROHDE & SCHWARZ and ICS compatible).

e. 1 X BIJOY-50.

f. 7 X Tx/Rx VHF Walkie Talkie.

g. 2 X Data Message Terminal (DMT).

h. 2 X Tx/ Rx Marine VHF for boarding operation (Latest model from MOTOROLA/ ICOM/ Q-MAC).

j. 2 X Tx/Rx VHF Air Band walkie-talkie.

k. Tactical Data Link with 01 X VHF Tx/Rx & 01 X HF Tx/Rx.

1002. **Integrated Communication System (ICS)**. An ICS needs to be installed in the Combat Information Centre (CIC) to integrate external communication equipment (mentioned in para 1001) with the Ships internal communication system (mentioned in para 0722aand 0722b) and General Broadcast System (mentioned in para 0723). The bidder must provide suitable ICS, including the name/type/model/country of origin & manufacturer of the supported external communication equipment.

1003. **Distress and Safety Communication Equipment**. Standard GMDSS (Global Maritime Distress and Safety System) equipment (DSC VHF for area A2) has to be provided in each LPC, including appropriate GMDSS equipment for the ship's boat. The standard GMDSS equipment should include, but not be limited to, the following;

a. 1 X DSC VHF Set

b. 1X DSC MF/HF Set

c. 1 X EPIRB (Emergency Position Indicating Radio Beacon).

d. 2 X SART (Search and Rescue Transponder).

1004. **Antenna**. All radio equipment is to be installed in each LPC with the associated antenna. Appropriate radiation signs and warnings are to be posted or marked near the antenna to alert of the radiation hazard. Antenna location should ensure minimum mutual interference and Electromagnetic compatibility. For positioning the antenna, Interference with other navigation and communication equipment needs to be considered. The antenna must not be exposed to the exhaust and should not be blinded by the superstructure.

1005. **Signaling Projectors**. Six signaling projectors (Preferably 500W, 20 inches) are to be provided and installed at a suitable location for each LPC.

1006. **Signaling Flag**. Two sets of dressing lines (complete with dressing flags) and two sets of signal flags with pennants are to be supplied.

1007. **Flag stowage.** Visual signaling stowage arrangements **(**2 X Flag locker &1 X VS store).

1008.**Visual communication.** 4 X Semaphore pair,6 X Black ball,4 X Black diamond.

1009.**National Flag, Ensign, Jack, and Distinguishing Flags** are to be included for ceremonial purposes:

a. 2 X National flag (8 breadth) (Ceremonial)

b. 2 X National flag (6 breadths)

c. 2 X BN ensign (8 breadth) (Battle ensign

d. 6 X BN ensign (6 breadths)

e. 6 X BN jack (6 breadths)

f. 2 Set of distinguishing flags and pennants (6 breadths)

g. 3 X commissioning pendant

1010. **Flashing Light**. Two in number flash signaling lights (Omni-directional) with necessary accessories are to be provided and installed at a suitable location on the main mast (yardarm) of each LPC.

1011. **Battery Power Backup**. All communication sets, Navigational Lights, GPS, Gyro Compass, and Steering System must be powered by the Main and Emergency DGs, with DC battery backup as well.

1012. **EW Equipment**. A standard ESM is to be installed onboard in each LPC. A suitable and sufficient number of launchers capable of firing Chaff (S and D) and IR Decoy is to be installed on board. The firing order of those launchers can be entered from the console in the CIC. Cost of all items (ESM and Chaff launcher with system) is to be quoted separately. The technical specification of ESM is as follows:

a. **ESM Technical Parameter**.

Ser	Description	Remarks
(1)	Type	To be mentioned
(2)	Brand	To be mentioned
(3)	Model	To be mentioned
(4)	Country of Origin	To be mentioned
(5)	Country of Manufacture	To be mentioned
(6)	Year of Manufacturing	2025 or later
(7)	Ingress Protection (IP)	Outdoor Unit: IP 65 or better (To be mentioned) Indoor Unit: IP 54 or better (To be mentioned)
General Characteristics		
(8)	Operational Target	Surveillance Radar, Fire Control Radar and Tracking Radar
(9)	Simultaneous Threats Handling Capability	To be mentioned
(10)	Frequency Range	Radar Signal DF Frequency: 2 – 18 GHz or better (To be mentioned)
(11)	Receiver (Antenna)Type	To be mentioned
(12)	Bearing Accuracy	To be mentioned
(13)	Bearing Quantization	To be mentioned
(14)	Frequency Accuracy	To be mentioned
(15)	Frequency Resolution	To be mentioned
(16)	Antenna coverage	Azimuth 360° Minimum Elevation ±30 (to -3db points) or better
(17)	Antenna polarization	The system will be able to detect all types of antenna Polarization
(18)	Sensitivity	-55 dBm or better (To be mentioned). Data extraction capability (Portable Hard Disk) be able to save 1200 Platforms for Data Correlation.
(19)	Dynamic Range relative to system sensitivity	To be mentioned
(20)	Receiver Data Rate	To be mentioned
(21)	Parameter Measurement: (a) Frequency (b) Bearing (c) Amplitude	To be mentioned

	(d) Pulse width (e) Pulse repetition interval/ frequency (f) Frequency agility (f) Pulse interval agility (g) Scan type (h) Time of Arrival (TOA) (j) Angle of Arrival (AOA) (k) Carrier Frequency (l) pulse descriptor words, etc.	
(22)	Emitter Data Storage Capacity	a. To be mentioned (Minimum 500 Emitter's Data). b. Any other (To be mentioned).
Display and Data Processing Unit		
(23)	Brand and Model	To be mentioned
(24)	Display Type	TFT/LCD/LED (To be mentioned)
(25)	Resolution	To be mentioned
(26)	HMI Devices	Details to be mentioned
(27)	EW Support System	a. Facility of extracting saved data from onboard ESM Library and insert processed data from outside sources (BN EW Center). b. Open and standard protocol for manual data sharing. c. Any other (To be mentioned)
Other Sub Unit		
(28)	Technical Details of other Sub Unit (if any)	To be mentioned

SECTION XI

WEAPONS AND ARMAMENTS

1101. **Weapon/ Armaments**. The ASuW LPC is to be capable of being used as a platform for carrying armament, which includes SSM, medium caliber guns, etc. The deck structure in those positions is to be strengthened accordingly. An INS gyro should be supplied to interface with a compatible FCS and Combat System. Similarly, the ASW LPC is to be capable of being used as a platform for carrying armament, including ASW weapons, medium-caliber guns, etc. The deck structure in those positions is to be strengthened accordingly. An INS gyro should be supplied to interface with a compatible FCS and ASW Suit. The bidder will provide all weapons and sensors (from an internationally renowned company) during the construction of the ship. All ammunition, targets, and test equipment required for the satisfactory testing and trials of weapons/armor will be provided by the bidder. The following weapons/armaments are planned to be fitted:

a. **Weapon/ Armaments of ASuW LPC**.

(1) 4 x SSM associated with CMS.

(2) 1 X 30 mm Gun RCWS with associated FCS.

(3) 2 X 12.7 mm guns with RCWS with associated FCS.

(4) Facility for laying mines.

b. **Weapon/ Armaments of ASW LPC**.

(1) 2 set twin/ triple tube ASW Torpedo Launcher with Standalone ASW Combat Management System.

(2) 1 X 30 mm Gun RCWS with associated FCS.

(3) 2 X 12.7 mm guns with RCWS with associated FCS.

(4) Facility for laying mines.

1102. **SSM with associated with the Combat System (ASuW LPC)**. The Bidder shall provide a reliable medium-range SSM with compatible combat systems to detect, identify, track, and engage designated maritime surface targets. Offered SSM with compatible combat systems should have suitable onboard launch options with accurate guidance and terminal targeting for fixed and moving targets. Offered SSM should have secure data links for mid-course updates integrated with the Combat Management System and organic sensors (Surveillance Radar, Navigational Radar, Gyro, GPS etc.). The design should be easy to maintain with a clear logistics plan (spares, diagnostics, test gear, and trained personnel),

strong cyber security and tamper protection, and human authorization controls for weapons release. Safety rules for handling, transport, storage, and demilitarization must follow recognized standards. The procurement must include test and evaluation plans, training & simulation and defined interoperability with onboard systems.

1103. **Twin/ Triple Tube ASW Torpedo Launcher with the Standalone ASW Combat Management System (ASW LPC)**. The Bidder shall provide a Twin/Triple Tube Torpedo Launcher System (STLS) designed for surface ships and comprising two sets of launchers, port and starboard, each configured with either twin (2 tubes) or triple (3 tubes) arrangements. It is to be compatible with light-weight ASW torpedoes such as Mk 46, Mk 54, MU90, A244S, or their equivalents. The launchers must be trainable, deck-mounted or fixed, and are integrated with the ship's Standalone ASW Combat Management System. Firing mechanisms can be manual, pneumatic, or electric, with manual reloading as standard and optional auto-loading capability (rare in light ASW systems). The system should support torpedo ranges of a minimum 10–12 km, depending on type, with adjustable azimuth launch angles spanning 0–180° and elevation either fixed or slightly adjustable.

1104. **Main Gun**. The ship's main gun will be a 30 mm RCWS with associated FCS, as per the BN's standardized model (SMASH 200/30, LIONFISH 30, SENTINEL 30, MSI-DS SEAHAWK DS30M A2, 30mm SUPER SEA ROUGE RCWS, Sea Snake 30, 30 mm Type CS/AN3or latest version of mentioned Gun).FCS of 30 mm GUN should be integrated with CMS. It is to be fitted in the forward part of the ship. The gun is to be provided with a necessary cooling system and power supply. The Gun is to be provided with an associated fire control system having local and remote firing facilities. The Gun and the FCS are preferred to be from the same origin. The main features of the 30 mm gun RCWS are as follows:

a. Fully automatic, capable of firing from a remote location.

b. Independent stabilized system for the director.

c. Day and night operation under adverse weather conditions with long-distance high sensitive cooled IR and Day TV camera.

d. Target detection and automatic target tracking.

e. Automatic ballistic computation and correction.

f. On move detection, tracking and firing through the stabilized turret and gun.

g. Integration with ships' on-board sensor and systems (Radar, Electronic Optic, Gyro, Log & meteorological sensors, etc.).

h. Manual operation as a back-up mode.

1105. **Secondary Gun**. Each ship is to be provided with two 12.7 mm Gun with RCWS (Brand, Model and Country of OEM to be mentioned) with associated FCS.FCS of 12.7 mm GUN should be integrated with CMS.

1106. **Illuminating Flare and Pyrotechnics**. A suitable locker for storing flares and pyrotechnics is to be provided in each LPC, with the necessary fire extinguishing arrangements.

1107. **Small Arms (BN Supply)**. Storing facility for the under-mentioned small arms with their ammunition and accessories, including web equipment, is to be made:

a. 4 x LMG.

b. 12x CSMGs.

c. 6 x Pistols.

d. 20 x Rifles.

e. 2 x Signal Pistols.

1108. **Gyro for Fire Control System**. The INS Gyro Compass(preferably Fiber Optic) will be provided with high accuracy level, to be supplied and interfaced with navigation radar, CMS, ESM and Fire control system for ASuW. Such INS Gyro Compass will also be provided with high accuracy level, to be supplied and interfaced with navigation radar, SONAR, ASW Combat Management System, ESM and Fire control system for ASW. The proposed gyro should provide extremely precise rotational rate information and quick settle time to facilitate the accurate firing The gyro platform is to be mechanically aligned accurately to meet manufacturer's installation specification. It will provide TRUE NORTH relative to the ship's heading.

1109. **Magazine**. Suitable magazine/(s) for stowage of ammunition for small arms, guns and Rockets are to be designed. The magazine should have a stowage capacity of approximately 2500 rounds of ammunition for 30 mm guns, 2500 rounds of ammunition for 12.7 mm guns, 4 x VSHORAD and a suitable number of rockets for the proposed Launchers. The magazine is to be constructed as watertight compartments with air-conditioned facilities. The magazine is to fulfill the following safety criteria for the prevention of fire:

a. The magazine is to be fitted with a flooding system. Flooding of the magazine may be considered freely through a sea valve or through a fire main. Valves in this system are to be provided with deck-operated rod gearing. The pumping out system is also to be fitted.

b. The magazine is also to be fitted with a sprinkling system.

c. Fire retarding paint is to be used in the magazine. These may be painted internally with non-flammable paint as approved by an internationally recognized classification society.

d. Approved type smoke/ fire detectors are to be installed in the magazine. Smoke/fire detectors are also to be installed in all adjacent compartments, except low-risk-value compartments, bathrooms, WCs, tanks, and lobbies, to operate alarms on the bridge and at the position adjacent to the gangway staff in the harbour.

e. All furniture in the magazine is to be manufactured of metal, including the magazine contents and/or state boards and key boxes.

f. Magazine is to be protected by a flash-tight barrier at the exit to the ammunition supply routes or as near to them as is practicable.

g. All electrical fittings in the magazine are to be of an intrinsically safe type and to be of watertight construction to 0.1 bar to protect them from water spray. Special fireproof, shielded cables and explosion-proof lights and fittings are to be fitted inside the magazine. All cabling in the magazine must be encased in metal conduct.

h. The details about the magazine are to be provided.

j. **Anti-Sabotage Arrangements**.

(1) All ventilation trunks are to be arranged to prevent the passage of articles or liquids into the compartment.

(2) Natural exhaust outlets are to be of anti-sabotage construction.

(3) All suction, sounding, filling tubes/pipes that terminate in or adjacent to or pass through a magazine are to be of all-welded construction and fitted with a lockable cap.

1110. **Hoist for Main Gun**. The magazine is to be designed below the gun bay, and the ammunition hoisting arrangements are to be made if it is available for offered gun. The hoisting system should be both electrically and manually driven.

1111. **RU Lockers for 30/ 12.7 mm Guns**.

a. RU lockers should be in the close vicinity of the guns.

b. RU lockers should have the capacity to store 400 rounds of ammunition for 30/ 12.7 mm guns.

c. RU lockers should be protected from fire.

d. Dual locking arrangements are to be provided on doors and hatches.

e. Fire retarding paint is to be used in RU lockers.

f. A sprinkling system is to be provided in each RU locker.

g. RU lockers are to be placed so they do not receive direct sunlight as a preventive measure against overheating.

1112. **Ammunition Handling**. The necessary means must be provided so that the ammunition can be loaded aboard, struck down, and removed as efficiently as possible, while ensuring safety and handling speed.

1113. **Helmets and Anti-Flash Hoods**. Helmets and anti-flash hoods are to be provided for all required gun crews and 20% extra.

1114. **Ammunition**. The required ammunition is to be provided as per the contract for the 30mm and 12.7mm guns.

SECTION-XII

MISCELLANEOUS

Spare parts, Tools, Test Equipment and Accessories

1201. **Spare Parts**. A proposal containing a list of fast-moving spares, item-wise prices, and a 5-year forecast should be submitted with the quotation. These spares are to be provided. The terms and conditions of the guarantee for the unrestricted supply of the said spares for a period of 15 years from the date of signing the contract are to be mentioned. The following equipment is to be considered.

a. Main engines, generator sets, gearboxes, auxiliary machinery, air conditioning and refrigerating plants.

b. Electrical and electronic equipment.

c. Sensors, armaments and torpedo system.

d. Spare parts for propulsion and power generation, control and monitoring systems.

e. Deck machinery

f. General systems and shafting.

g. All galley equipment, Water generating system and water purifiers.

h. Any other equipment deemed necessary by the government-owned shipbuilder. In this connection, spare parts for all main engines, generator sets, and gearboxes are to be supplied in accordance with the following criteria.

j. **Main Engine**.

Ser	Description	Total Quantity
(1)	Main bearings complete with shims, bolts and nuts, complete for one engine	3 in no per engine
(2)	Large end bearing complete with shims, bolts and nuts for one cylinder	1 set per ship
(3)	Small end bearing complete with shims, bolts and nuts for one cylinder	1 set per ship
(4)	Gudgeon pins with bush for one cylinder (if applicable)	1 set per ship
(5)	Piston	2 in no per engine
(6)	Cylinder head assembly Complete	1 in no per ship
(7)	Liner Complete	2 in no per engine
(8)	Complete set of piston rings	1 set per engine
(9)	Cylinder head gaskets for all cylinders	1 set per engine
(10)	Fuel injector complete	6 in no per ship
(11)	Electronic governor	1 in no per ship

(12)	Air inlet valve complete with seat, spring and fittings for all cylinders	6 in no per ship
(13)	Exhaust valve complete with seat, spring and fittings for all cylinders	6 in no per ship
(14)	Push rod	2 in no per ship
(15)	Fuel injection pumps complete with plungers, sleeve valves, springs, etc.	1 set
(16)	Pressure gauges, different types	1 set per ship
(17)	Temperature gauges, different types	1 set per ship
(18)	Crank case door joint	1 set per engine
(19)	Filter elements, all types fitted	4 sets per engine
(20)	O-rings, all types fitted	3 sets per engine
(21)	Gaskets, all types fitted	3 sets per engine
(22)	Seals, all types fitted	3 sets per engine
(23)	Joints, all types fitted	3 sets per engine
(24)	Split pins, all types fitted	1 set per ship
(25)	Sensors (All kinds)	2 sets per ship

k. **Generator Set**.

Ser	Description	Total Quantity
(1)	Main bearings complete with shims, bolts and nuts, complete for one engine	3 in no per engine
(2)	Large end bearing complete with shims, bolts and nuts for one cylinder	1 set per ship
(3)	Small end bearing complete with shims, bolts and nuts for one cylinder	1 set per ship
(4)	Gudgeon pins with bush for one cylinder (if applicable)	1 set per ship
(5)	Piston	2 in no per engine
(6)	Cylinder head assembly Complete	1 in no per ship
(7)	Liner Complete	2 in no per engine
(8)	Complete set of piston rings	1 set per engine
(9)	Cylinder head gaskets for all cylinders	1 set per engine
(10)	Fuel injector complete	8 in no per ship
(11)	Electronic governor	2 in no per ship
(12)	Air inlet valve complete with seat, spring and fittings for all cylinders	6 in no per ship
(13)	Exhaust valve complete with seat, spring and fittings for all cylinders	6 in no per ship
(14)	Push rod	2 in no per ship
(15)	Fuel Injection pumps complete with plungers, sleeve valves, springs, etc.	1 set
(16)	Pressure gauges, different types	1 set per ship
(17)	Temperature gauges, different types	1 set per ship
(18)	Crank case door joint	1 set per engine
(19)	Filter elements, all types fitted	4 sets per engine
(20)	O-rings, all types fitted	3 sets per engine

(21)	Gaskets, all types fitted	3 sets per engine
(22)	Seals, all types fitted	3 sets per engine
(23)	Joints, all types fitted	3 sets per engine
(24)	Split pins, all types fitted	1 set per ship
(25)	Sensors (All kinds)	2 sets per ship

l. **Alternator and Control/Monitoring Panel**.

Ser	Description	Total Quantity
(1)	AVR (complete)	2 in no per ship
(2)	The governor controls PCB	2 sets per ship
(3)	Magnetic pickups	2 sets per ship
(4)	Rotating diodes	2 sets per ship
(5)	Potentiometers (all types)	2 sets per ship
(6)	Control knobs (all types)	2 sets per ship
(7)	Valves/Solenoids	2 sets per ship
(8)	Other PCBs (all types)	1 set per ship
(9)	Indication lights (all types)	1 set per ship
(10)	Relays/ contracts	1 set per ship
(11)	Thermostats	2 sets per ship
(12)	Meters, i.e., voltmeter, wattmeter, ammeter, frequency meter, etc.	1 set per ship
(13)	3 Pole air circuit breaker, 200 Amps	1 in no per ship
(14)	3 Pole air circuit breaker, 100 Amps	1 in no per ship
(15)	3 Pole air circuit breaker, 50 Amps	1 in no per ship
(16)	3 Pole air circuit breaker, 30 Amps	1 in no per ship
(17)	3 Pole air circuit breaker, 20 Amps	1 in no per ship
(18)	Bearing for Alternator	1 set per ship
(19)	Self-Starter	1 in no per ship
(20)	Dynamo/ Charger	2 sets per ship
(21)	Sensors (All kinds)	2 sets per ship

m. **Gearbox**.

Ser	Description	Quantity for each gearbox
(1)	Filter elements (all types of filters)	4 of each
(2)	Temperature gauge	2
(3)	Pressure gauge	2
(4)	Cooler seal	4
(5)	Anode for a cooler	2
(6)	Control valve seal	2
(7)	Control valve seal	2
(8)	Clutch plate assembly	1 Set
(9)	Pressure plate assembly	1 Set

1202. **Special Tools**. The following special tools are to be supplied with each LPC:

a. 1 x Propeller nut spanner.

b. 1 Set of Propeller pulling device.

c. 3 x Grease guns with nipple.

d. 3 x Tool boxes with standard tools.

e. 2 sets of Socket spanners (Range to be mentioned).

f. 2 sets of Ring spanners (Range to be mentioned).

g. 2 sets of open-end spanners (Range to be mentioned).

h. 2 sets of L-end key (Range to be mentioned).

j. 3 sets of Files (Range to be mentioned).

k. 2 x Vernier calipers (Range to be mentioned).

l. 2 x Micrometers (Range to be mentioned).

m. 3 sets of Adjustable spanners (Range to be mentioned).

n. 2 x Carpentry tool boxes with standard tools (Details of tools are to be mentioned).

p. 2x bearing extractors (Standard size).

q. 2 x Chain block (2 tons capacity).

r. 2 x Chain block (3 tons capacity).

s. 1 x Torque spanner (Range to be mentioned).

t. 2 x Punch set (Range to be mentioned).

u. 2 x Tool Kit Set (Brief Case of all necessary tools for the electrical system).

v. 2X Safety Harness for working in a radio-electrical system fitted in the mast.

w. 1X Portable Hot Blower.

x. 1X Portable Hand Blower.

y. A set of supplementary tools such as workbench, hoisting gear and deck tools.

z. The list of items in the set of supplementary tools is to be mentioned.

aa. 1X Lub oil and cooling water test kit.

ab. 1 X Crimping tool set.

1203. **Test Equipment**. The following test equipment is to be supplied with the LPC:

a. 2 X Digital Multimeter.

b. 2 X Weber Tester.

c. 1 X Clamp Tester.

d. 1 X Bridge Megger.

e. 2 X Wee Megger(500V & 250V).

f. 1 X Digital Tachometer.

g. 1 X Lumen Tester.

h. 1 X Optical Fiber Fusion Splicer Machine.

1204. **Accessories**. Standard accessories for all machinery and equipment, in addition to those mentioned herein, are to be supplied.

1205. **Drawings**. All the drawings required should be provided with the ship at the time of delivery. Moreover, the following drawings should be included:

a. As fitted General arrangement drawing

b. As fitted Machinery and Equipment plan

c. As fitted Armament and Magazine drawing

d. As fitted Ventilation and Air Conditioning diagram

e. As fitted Electrical wiring diagram

f. Arrangement of tanks

g. Arrangement of main shafting.

h. All construction and installation drawings.

j. Docking plan and alternate docking plan.

1206. **Manuals and Documents**. Plans and drawings of construction, hull, outfitting, accommodation, general arrangement, machinery, electrical, and weapons, operation and maintenance manuals (workshop levels), including parts catalogues, will be provided by the bidder (refer to article 0113). All plans and documentation, name plates, and caution/identification plates will be written in English. Following manuals/parts catalogues/ documents (3 copies for each ship) of all machinery, equipment, armament, control, system, etc. (in English language) are to be supplied with the ship at the time of delivery:

a. Operation and maintenance manual.

b. Maintenance schedules.

c. Workshop-level repair manual.

d. Parts catalogue.

e. Electric circuit diagrams and faultfinding flow charts.

f. Installation drawing.

g. Ship's data book.

1207. **Inclining Experiment, Factory Acceptance Test (FAT), Harbour Acceptance Trial (HAT) and Sea Acceptance Trial (SAT)**. Prior to keel laying, the basic design and production drawings of the hull and superstructure are to be finalized upon approval from the Classification Society and BN's representative (Project Implementation Team). During construction, all production drawings and installation diagrams are to be approved by the BN's representative (Project Implementation Team), and upon completion of each work, inspection is to be conducted jointly by the BN's representative, the bidder/builder, and the class (as applicable). Tests and trials of individual equipment and machinery at various levels, i.e., FAT, STW (Setting to Work/Installation), HAT, SAT, etc., as applicable, are to be conducted jointly by the BN's representative and the bidder. Test/trial procedure of each stage is to be submitted to the BN's representative well in advance, duly concurred by the class (as applicable) for necessary approval. A list of the tests and trials to be conducted during HAT and SAT must be submitted to and approved by the BN. However, the test and trial are to include the following:

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

b. **Factory Acceptance Test (FAT)**. Before delivery to a government-owned shipyard, all machinery, equipment’s and items are to be factory tested in the presence of the classification society. To this effect, copies of FAT certificates are to be provided. Provisions are to be made so that BN representatives can attend FATs for major equipment and systems (such as Main Engines, Generators, Torpedo system, 30mm RCWS, Air and Surface Search Radar, ASW CMS, ASuW CMS) at the manufacturer's premises. BN will bear the cost of international airfare, pocket money, food and accommodation. Still, the foreign shipbuilder will bear the internal transportation cost and other related costs.

c. **On Board Test**. During on-board testing, all machinery, equipment, piping, and wiring systems supplied and/or installed on board are to be tested, as far as practicable, and should meet the requirements of the international classification society (as applicable). The following equipment/ machinery shall be checked for good operating condition:

(1) Control of the propulsion system.

(2) Navigational aids.

(3) Internal communication system.

(4) Fixed fire-fighting system.

(5) Fuel transfer system.

(6) General Service and bilge system.

(7) Fresh water system.

(8) Electrical power generation and distribution system.

(9) Ventilation and air conditioning system.

(10) Watertight integrity of the compartments.

(11) Pressure test for tanks.

(12) Lowering/hoisting test for RHIB.

(13) Anchor, capstan and self-stowage of cable.

(14) Galley equipment.

(15) Refrigeration system.

(16) Steering system.

(17) Piping pressure test

d. **Harbour Acceptance Trial (HAT)**. Performance test of all machinery and equipment is to be carried out with BN personnel on board. The harbour trial of the following machinery is to be carried out before sea trial, and the test should meet the international classification society's requirement (as applicable):

(1) Main engines are to be tested according to standard practice.

(2) Auxiliary machinery is to be tested according to standard practice.

(3) All pumps and other engine room equipment are to be tested.

(5) The steering system is to be checked for leakage.

(6) All armaments, including the torpedo system, are to be tested as per standard practice.

e. **Sea Acceptance Trial (SAT)**. Standard Sea Acceptance Trial of the ship is to be conducted by the bidder in the presence of BN personnel and manufacturers of the concerned major equipment on board. SAT shall be carried out to verify the correct operation of the systems and machinery during underway and to check that the test performance complies with the LPC's specification. The trial will include:

(1) Maximum speed trial.

(2) Crash stop maneuver trial.

(3) Economic speed trial.

(4) Turning circle test at full power.

(5) Endurance.

(6) Testing of ASW weaponry system equipment/ Testing of ASuW weaponry system equipment.

(7) Proof firing of all guns.

f. Ship's gun firing trial will have to be arranged by the bidder during SAT. Necessary ammunition and target are to be arranged by the bidder.

1208. **Personnel Training**. Orientation training for 10 weeks on the operation and maintenance of machinery, equipment, and systems is to be arranged and conducted by the bidder in the shipyard after the ship's launch.

1209. **Validity of Offer**. Up to 30 June 2026.

1210. **Article-Wise Compliance Sheet.** An Article-Wise Compliance Sheet needs to be submitted for the Purchaser's Tender Specification of LPC, as per Annex L.

Annexes:

A. Summary of Tender Prices for Four LPC with Accessories, Spare Parts, Tools and Services -1(One) page.

B. Price Schedule for Service Related to construction and Training - 1(One) page.

C. Price Schedule for Material Package, including Construction Material and All Types of Machinery and Equipment - 1 (One) page.

D. Special Terms/Conditions for the Contract - 3 (Three) pages.

E. Comparison of Design Particulars between Proven and Offered LPCs -2 (Two) pages.

F. Detail of Ship's Boat - 2 (Two) Pages.

G. Detail list of Fire Fighting System - 3 (Three) pages.

H. List of Diving Equipment - 1(One) Page.

J. Mess Traps, Mess Utensils and Galley Implements - 4 (Four) pages.

K. RAS gear, towing gear, berthing hawsers - 2 (Two) Pages.

L. Article-Wise Compliance Sheet on the Purchaser's Tender Specification of LPC - 9 (Nine) Pages.

ANNEX A TO
TENDER SPECIFICATION FOR
CONSTRUCTIONO F LPC FOR BN

SUMMARY OF TENDER PRICES FOR FOUR LPC WITH ACCESSORIES, SPARE PARTS, TOOLS AND SERVICES

S No	Description	Price (in BDT Taka)		Any other Charges	Total price of four LPC
		For two ASW LPC	For two ASuW LPC		
1.	Price of design package including all design, drawings, etc				
2.	Price of total material package including all sorts of construction material, propulsion and all other machinery				
3.	Price of mandatory spare parts in accordance with art 12:01				
4.	Price of general and special tools and test equipment's in accordance with 12:02 and 12:03				
5.	Cost of services related to construction and training				

SIGNATURE …… DATE ……..

NAME …….. SEAL ……

ANNEX B TO
TENDER SPECIFICATION FOR
CONSTRUCTIONOFLPC FOR BN

PRICE SCHEDULE FOR SERVICE RELATED TO CONSTRUCTION AND TRAINING

S No	Description	Price (in BDT Taka)		Total price of four LPC
		For two ASW LPC	For two ASuWLPC	
1.	Orientation Training on operation and maintenance of machinery, equipment's and systems.			
2.	Services of shipbuilding experts, machinery installation experts etc related to construction in accordance with Article 01.03.b.(11).			
3.	Services related to construction in accordance with Article 01.03b.			

SIGNATURE ……

NAME ……..

DATE …….. SEAL ……

ANNEX C TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

PRICE SCHEDULE FOR MATERIAL PACKAGE INCLUDING CONSTRUCTION MATERIAL AND ALL TYPES OF MACHINERY AND EQUIPMENT

S No	Description	CFR upto BD port (in FC)		CFR up to BD port in equivalent BD Taka)		C & F Charges (in BD Taka)		Total Price of Material Package
		TwoASW LPC	TwoASuW LPC	Two ASW LPC	Two ASuW LPC	Two ASW LPC	Two ASuW LPC	
1.	Price of construction material packages provided by foreign shipbuilder.							
2.	Price of propulsion machinery, its control system, gearboxes, shafting & propellers provided by foreign shipbuilder.							
3.	Price of electrical power generation and distribution system							
4.	Price of all auxiliary machinery and equipment provided by foreign shipbuilder.							
5.	Price of all deck machinery provided by foreign shipbuilder.							
6.	Price of electrical and electronic equipment (including navigational, communication equipment, Sensor etc) provided by foreign shipbuilder.							
7.	Price of ASW weaponry System, FC system and Armaments provided by foreign shipbuilder.							
8.	Price of all material package provide by KSY in accordance witharticle 01.03.b.(8).							

SIGNATURE ……..…… NAME ……..... DATE …… SEAL …….

ANNEX D TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR IN

SPECIAL TERMS/CONDITIONS FOR THE CONTRACT

Insufficient Speed

1. The bidder will have to give guarantee that the supplied propulsion machinery will enable the ship to achieve the desired maximum speed (as mentioned in the contract) and an endurance of not less than 2000 nautical miles at a economic speed in full load condition

2. In case the LPC fails to achieve the maximum speed as stated in the contract specification, then penalties will be imposed on the bidder for non-compliance of the contract as per the following:

S No	Speed Deficiency from that of mentioned in the contract specification	Penalty counted in % of total contract value of two LPC for Speed Deficiency in case of one LPC	Penalty counted in % of total contract value of two LPC for Speed Deficiency in case of two LPC
1.	0.10 to 0.49 knot	Nil	Nil
2.	0:50 to 0.99 knot	2%	4%
3.	1.00 to 1.49 knots	3%	6%
4.	11.50 to 1.99 knots	4%	8%
5.	12.00 to 2.49 knots	5%	10%
6.	12.50 to 2.99 knots	6%	12%

3. If the deficiency in actual speed of the LPC is more than two and a half (2.5) full knots below the speed guaranteed in the offer, then BN, at its option, may, subject to the bidder's right to effect alternations or corrections, cancel the Contract

Delayed Delivery

4. Delay in delivery of any one of the LPC shall mean partial delay in delivery and will be dealt individually. BN is satisfied that the failure to deliver LPC within the scheduled delivery period has been for reasons within the control of the bidder, and/or if the Government has suffered loss for reasons of belated delivery, liquidate damages, will be recovered at the rate of 1% of the value of each LPC per month or fraction there of the period exceeding the original delivery period, subject to the provision that the total liquidated damages thus leviable will not exceed 10% of the contract value of each LPC.

5. Delay in the delivery of each LPC up to 21 days will be regarded as "Grace Period available to the bidder and the delivery date (ending as of 12 O'clock midnight Bangladesh Time on delivery date as mentioned in the Article 01.11 and 02.14) will

be considered to have been automatically extended up to that limit without issuance of any formal amendment and payment of any liquidated damages. For delays beyond 21 days, formal amendment to delivery period will be calculated from the original delivery date given in the contract.

6. As soon as it is apparent that, the dates of delivery cannot be adhered to, the bidder shall send an application for extension of delivery period to BN. If failure to deliver within scheduled time as aforesaid shall have arisen from any cause which BN may admit as a reasonable ground for the extension of delivery period, BN may allow such additional time as he considers to be justified without imposing liquidated damages. If the delay is considered by BN due to reasons within the bidder's control, the extension may be granted with liquidated damages. The decision of BN on the issue shall be considered as final.

7. But if the delay in delivery of each LPC continues for a period of more than three hundred and sixty (360) days beyond the date upon which the delivery is due from the bidder under the terms of this CONTRACT, then, in such event, and after such period has expired. BN may, at its opinion, cancel this contract by serving upon the bidder a notice of cancellation directed to the bidder's address given in this contract.

8. For the purpose of this Article, the delivery of LPC shall be deemed to be delayed when and if LPC, after taking into account extension of the Delivery Date or permissible delays as provided in the contract, is delivered beyond the date upon which delivery would then be due under the terms of the contract.

9. During delivery if number of item/items remains short supplied which shall not affect/ hamper operational capability of LPC, delivery of LPC may be accepted by BN. under mutual agreement between BN and bidder.

Force Majeure

10. Notwithstanding the provision of the previous clauses, the bidder shall not be liable for forfeiture of its performance security, liquidated damages or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the contract is the result of an event of force majeure.

11. For purposes of this clause, force majeure means an event beyond control of the supplier and not involving the suppliers fault or negligence and not foreseeable. Such events may include, but are not restricted to, acts of the purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight and freight embargoes.

12. If a force majeure situation arises, bidder shall promptly notify the purchaser in writing of such condition and the cause thereof. Unless otherwise directed by BN

in writing the supplier shall continue to perform its obligations under the contract as far as is reasonably practical, shall seek all reasonable alternative means for performance not prevented by the force majeure event.

Omission

13. In case the bidder fails to supply / provide any of the items (ie. machinery, equipment's, sensors, torpedo system and armaments etc) within the scope of supply of the contract for construction of LPC, the contract price shall be adjusted by deducting the quoted price of the item along with 25% penalty based on the quoted price of the item. If the price of the item is not quoted in the original offer, BN shall have the right to determine the price of the item based on procurement price of similar item by the BN through DGDP/NSSD, Dhaka or any other means. However, if the omission/correction is made under mutual agreement between the buyer and bidder no penalty will be made.

Arbitration

14. All legal dispute of whatever kind arising out of the contract concluded between the parties including disputes regarding validity of contract shall be settled wherever possible amicably with the exclusion of ordinary Court of Law. Should this not be possible the dispute can/shall be settled with the strict application of the law of the land under the rules of arbitration of the Bangladesh Chamber of Commerce / International Chamber of Commerce by arbitration appointed in accordance with the rules. The said Court of Arbitration having jurisdiction is explicitly competent to decide overall legal dispute arising from or concerning the Contract. The Court of Arbitration shall have the right to determine its own rules of the procedure in its absolute discretion. It shall. However, grant both the parties opportunity to present their case and their proofs in writing and by words of mouth in the course of the proceedings.

ANNEXE TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

COMPARISON OF DESIGN PARTICULARS BETWEEN PROVEN AND OFFEREDASuW LPC

Ser	Proven ASuWLPC	Offered ASuWLPC
1.	Principal Dimensions: a. Length: b. Breadth: c. Draught:	Principal Dimensions: a. Length: b. Breadth: c. Draught:
2.	Displacement: a. Full load b.Light load	Displacement: a. Full load b. Light load
3.	Hull form	Hull form
4.	Maximum speed achieved at full load condition	Maximum speed achieved at full load condition
5.	Endurance at cruising speed	Endurance at cruising speed
6.	Cruising Speed	Cruising Speed
7.	Stability Characteristics	Stability Characteristics
8.	Speed power calculation/ curves	Speed power calculation/ curves

COMPARISON OF DESIGN PARTICULARS BETWEEN PROVEN AND OFFERED ASW LPC

Ser	Proven ASW LPC	Offered ASW LPC
9.	Principal Dimensions: a. Length: b. Breadth: c. Draught:	Principal Dimensions: a. Length: b. Breadth: c. Draught:
10.	Displacement: a. Full load b.Light load	Displacement: a. Full load b. Light load
11.	Hull form	Hull form
12.	Maximum speed achieved at full load condition	Maximum speed achieved at full load condition
13.	Endurance at cruising speed	Endurance at cruising speed
14.	Cruising Speed	Cruising Speed
15.	Stability Characteristics	Stability Characteristics
16.	Speed power calculation/ curves	Speed power calculation/ curves

SIGNATURE _____

SEAL----------

NAME _____

DATE _____

ANNEX F TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

ARTICLE-WISE COMPLIANCE SHEET ON THE PURCHASER'STENDER SPECIFICATION OF LPC (TO BE FILLED BY THE TENDERER)

SECTION II GENERAL CHARACTERISTICS			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
02.01	Functions		
02.02	General Description		
02.03	Displacement at full load		
02.04	Dimensions		
02.05	Speed		
02.06	Endurance		
02.07	Propulsion and maneuvering		
02.08	Power		
02.09	Seaworthiness		
02.10	Complement		
02.11	Construction		
02.12	Design		
02.13	Place of construction		
02.14	Project duration		
02.15	Special features		
02.16	Wartime mission length		
02.17	Ops room/ Combat center		
02.18	Signature		
02.19	Armament		
02.20	Navigation, Direction and RADAR		
02.21	Communication and EW		
02.22	Accommodation		
02.23	Logistics Arrangement		
02.24	Miscellaneous		
02.25	Classification		
02.26	Standard		

SECTION III DESIGN AND DRAWING			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
03.01	Introduction		
03.02	Design Philosophy		

03.03	Design Criteria and Standards		
03.04	Design		
03.05	Classification		
03.06	Certification of Drawings		
03.07	List of Drawings		
03.08	Fees for Certification		
03.09	Drawing Package		
03.10	Special Condition		

SECTION IV
HULL AND STRUCTURE

Art. No	**Description**	**Shall comply or not**	**Deviation if any**
04.01	General		
04.02	Construction		
04.03	General Arrangement		
04.04	Hull Structure		
04.05	Hull Materials		
04.06	Scantlings		
04.07	Frames		
04.08	Side Longitudinal		
04.09	Deck Longitudinal		
04.10	Bulkheads		
04.11	Bulkhead Stiffeners		
04.12	Main and Auxiliary Machinery Seating		
04.13	Engine Room Hatches		
04.14	Anchor Chain/Cable Locker		
04.15	Sea chests/Sea Inlets		
04.16	Construction of Tanks		
04.17	Hawse pipe		
04.18	Superstructure		
04.19	Foundation for Torpedo launchers and Guns		
04.20	Magazine		
04.21	Small Arms stowage		
04.22	Primary Surface Preparation andShop Priming		
04.23	Painting		
04.24	Cathodic Protection		
04.25	Insulation and Deck Coverings		
04.26	Signature		
04.27	Hull Designation and Markings		

SECTION-V DECK AUXILIARY AND ACCOMMODATION OUTFIT			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
05.01	General		
05.02	Watertight Doors		
05.03	Miscellaneous Non-watertight Doors		
05.04	Hatches		
05.05	Manholes and Covers		
05.06	Bolted Patches		
05.07	Windows		
05.08	Side Scuttles and Portholes		
05.09	Plan for Doors, Windows and Openings		
05.10	Ladders		
05.11	Rails and Stanchions		
05.12	Floor Plates and Gratings		
05.13	Mast		
05.14	Mast Jack Staff and Ensign Staff		
05.15	Navigation Light Boxes		
05.16	Air Inlet Gratings		
05.17	Air Dust Covers		
05.18	Bollards		
05.19	Fairlead		
05.20	Cleats and Eyebolts		
05.21	Towing Bitt		
05.22	Towing Rope		
05.23	Mooring/ Berthing Hawsers		
05.24	Reels		
05.25	Riggings		
05.26	Canvas		
05.27	Shore Gangway/ Brow		
05.28	Locks, Keys and Tags		
05.29	Key Boards		
05.30	Safety Appliances		
05.31	Fire Fighting		
05.32	Fire & Smoke Detector		
05.33	Damage Control Equipment/ item		
05.34	Diving Equipment Room		
05.35	Flag and Navigation Shape Locker		
05.36	Miscellaneous		
05.37	Deck Machinery		
05.38	Steering Gears		

05.39	Anchor and Chain Cable		
05.40	Capstan		
05.41	RAS Gears		
05.42	Furniture		
05.43	Furniture Application for Living Spaces and Bridge		
05.44	Furniture for Exposed Deck and Other Spaces		
05.45	Fittings of Sanitary Spaces		
05.46	Galley		
05.47	Ward Room Pantry		
05.48	Senior Rates Pantry		
05.49	Mess Traps, Mess Utensils and Galley Implements		
05.50	Office Equipment		
05.51	Deck/Boat Crane		
05.52	Seamanship Items		

SECTION-VI **ENGINEERING MACHINERY, EQUIPMENT AND SYSTEMS**			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
06.01	General		
06.02	Propulsion System		
06.03	Technical Specification of Engine		
06.04	Ambient Condition		
06.05	Design and Record of Sales		
06.06	Maintenance Facility		
06.07	Automatic Protection Devices		
06.08	Machinery Control, Monitoring and Alarm System		
06.09	Classification		
06.10	Engine Load Test		
06.11	Specific Fuel Consumption (sfc)		
06.12	Fuel System		
06.13	Lubricating Oil System		
06.14	Cooling Water System		
06.15	Starting System		
06.16	Shutdown System		
06.17	Combustion Air System		
06.18	Exhaust System		
06.19	Mountings		
06.20	Torsional Vibration Damper		
06.21	Power Transmission		
06.22	Gear Box		
06.23	Propeller		
06.24	Technical Particulars of Shafting		

06.25	Thrust block		
06.26	Sensors, Indicators and Gauges		
06.27	Instruments to be mounted on Main Engines		
06.28	Remote Control from MCR		
06.29	Remote Control from Bridge		
06.30	Ship's Compressed Air System		
06.31	Generating Plant, Diesel Engines for Generators		
06.32	Fresh Water System		
06.33	Firemain System (Ship's Main Sea Water System)		
06.34	Domestic Sea water Hydrophore System		
06.35	Sewage System		
06.36	Bilge and Deck wash System		
06.37	Sea Chests/Sea Inlets		
06.38	Fuel Oil Tank and System		
06.39	Lubricating Oil Tank and System		
06.40	Air Conditioning and Ventilation		
06.41	Refrigerating Plant		
06.42	Piping		
06.43	Heat Exchangers		
06.44	Air and Exhaust Arrangement		
06.45	Filling, Sounding and De-aerationSystem		
06.46	Fin Stabilizer		
06.47	Protection against Manna Pollution		
06.48	POL and Chemicals		
06.49	Manuals and Drawings		
SECTION- VII ELECTRICAL EQUIPMENT, MACHINERY AND SYSTEM			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
07.01	General		
07.02	Ship's Main Power System		
07.03	Schematic Diagram		
07.04	Electrical Load Analysis		
07.05	Provision of Power for Future Equipment		
07.06	Equipment and Items of ElectricalSystem		
07.07	Main Generators Sets		
07.08	Main Switchboard		
07:09	Power Distribution System		
07.10	Distribution Panel/Switch Box		

07.11	Conversion Machinery		
07.12	Shore Supply Arrangement		
07.13	Ship Along Side FeederBreaker		
07.14	Battery Switchboard		
07.15	Cables		
07.16	Motors and Starters		
07.17	Lighting		
07.18	Navigation Auxiliary Equipment		
07.19	Fans		
07.20	Power Receptacles		
07.21	Ship's Alarm System		
07.22	Internal Communication System		
07.23	General Broadcast and Entertainment System		
07.24	Central TV Receiving System		
07.25	Bonding Strip		
07.26	Miscellaneous Electrical Equipment		

SECTION VIII **NAVIGATION EQUIPMENT/ AIDS**			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
08.01	General		
08.02	Gyro Compass		
08.03	Magnetic Compass		
08.04	Echo Sounder		
08.05	Speed Log		
08.06	Horns/Sirens		
08.07	Navigation Radar		
08.08	GPS		
08.09	Chart Table		
08.10	Helmsman Rest		
08.11	Barometer		
08.12	Barograph		
08.13	Binoculars		
08.14	Chronometer and Watches		
08.15	Anemometer		
08.16	Navigation Lights		
08.17	Additional Navigation Equipment/item		
08.18	Standard Meteorological Arrangement		
08.19	Necessary Drawings		
08.20	Dimming of lights		

SECTION IX SENSORS			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
09.01	General		
09.02	Navigation RADAR		
09.03	Surface Search RADAR		
09.04	FC System and FC RADAR		
09.05	Sonar		
09.06	Underwater Telephone and Bathythermograph		
09.07	ASW Combat Suit		
09.08	State boards		

SECTION X COMMUNICATION EQUIPMENT			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
10.01	External Communication Equipment		
10.02	Distress and Safety Communication Equipment's		
10.03	Internal Communication System		
10.04	Antenna		
10.05 10.06	Signaling Projectors Signaling Flag		
10.07	EW Equipment (Optional)		

SECTION XI WEAPONS AND ARMAMENTS			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
11.01	Weapon/Armaments		
11.02	Installation of Torpedo System		
11.03	Close Range ASW Weapon (Optional)		
11.04	Main Gun		
11.05	Secondary Guns		
11.06	Illuminating Flare and Pyrotechnics		
11.07	Small Arms (BN Supply)		
11.08	Gyro for Fire Control System		
11.09	Magazine		
11.10	Hoist for 57 mm and 40/30 mm Guns		
11.11	RU Lockers for 40/30 mm Guns		
11.12	Ammunition Handling		

SECTION-XI MISCELLANEOUS			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
Spare Parts, Tools, Test equipment and Accessories			
12.01	Spare parts		
12.02	Spare Tools		
12.03	Test equipment		
12.04	Accessories		
12.05	Drawings		
12.06	Manuals and Documents		
Inclining Experiment, Factory Acceptance Test (FAT), Harbour Acceptance Trial (HAT), Sea Acceptance Trial (SAT) and Training			
12.07	General		
	a. Inclining Experiment		
	b. Test and Trial		
	(1) Factory Acceptance Test		
	(2) Harbour Acceptance Trial		
	(3) Sea Acceptance Trial		
12.08	Personnel Training		
12.09	Validity of offer		

ANNEX D SPECIAL TERMS AND CONDITIONS FOR THE CONTRACT			
Art. No	**Description**	**Shall comply or not**	**Deviation if any**
1-3	Insufficient Speed		
4-9	Delayed Delivery		
10-12	Force Majeure		
13	Omission		
14	Arbitration		

ANNEX G TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

FIRE FIGHTING SYSTEM

TOTAL CO2 FIRE EXTINGUISHER-15

Ser	Place/Post	Qty	Rmks
1.	BRIDGE	02	-
2.	HF ROOM	01	-
3.	CIC	01	-
4.	EQUIPMENT ROOM NO-1	01	-
5.	GALLEY	01	-
6.	BATTERY ROOM	01	-
7.	EMERGENCY DG ROOM	01	-
8.	OUTSIDE PAINT STORE	02	-
9.	GUN BAY, SENIOR RATING MESS	02	-
10.	E/ROOM, MCR, DG ROOM	03	-

TOTAL FOAM TYPE FIRE EXTINGUISHER-23

Ser	Place/Post	Qty	Rmks
1.	OUTSIDE HQ-1	03	-
2.	ARMORY	01	-
3.	CIC	01	-
4.	OUTSIDE FAN ROOM	02	-
5.	GALLEY	01	-
6.	OUTSIDE SENIOR RATING MESS	02	-
7.	EMERGENCY DG ROOM	01	-
8.	OUTSIDE PAINT STORE	01	-
9.	GUN BAY	01	-
10.	E/ROOM, MCR, DG ROOM	03	-
11.	OUTSIDE JUNIOR RATING MESS	02	-
12.	PROVISION STORE	01	-
13.	TILLER FLAT	01	-
14.	FWD MAGAZINE	01	-
15.	GUNNERY STORE	01	-

TOTAL AFFF CONTAINER-04

Ser	Place/Post	Qty	Rmks
1.	BRIDGE LOBBY	01	-
2.	OUTSIDE CIC	01	-
3.	OUTSIDE PO`S MESS	01	-
4.	OUTSIDE PAINT STORE	01	-

FIRE FIGHTING EQUIPMENT

Ser	Place/Post	Qty	Rmks
1.	EDBA	05	FF & DC Locker (Main Lobby)
2.	FULL FIRE FIGHTING RIG	05	FF & DC Locker (Main Lobby)
3.	PORTABLE DIESEL PUMP	02	Fox'l& Q/Deck
4.	SUBMERSIBLE PUMP	03	T/ Flat & DG Room
5.	FIRE & BILGE PUMP	02	E/ Room & DG Room

TOTAL FIRE HYDRANT-14

Ser	Place/Post	Qty	Rmks
1.	OUTSIDE NBCD HQ-1	01	NBCD HQ-1 to Bridge & 30mm Gun Deck
2.	FOX`L	02	Fox'l to Fore Peak & W/Room Lobby
3.	OUTSIDE CIC	01	Outside CIC to Ships Galley & W/Room Lobby
4.	OUTSIDE J/RATING MESS	01	Outside J/Rating Mess to Log Compt. & Gunnery Store
5.	Q/DECK	03	Q/Deck to DG Room, T/Flat, Aft Magazine & Diving Store
6.	PROVISION ROOM	01	Provision Room to DG Room & Aft Magazine
7.	DG ROOM	02	DG Room to Provision Room, MCR & Engine Room
8.	OUTSIDE PAINT STORE	01	Outside Paint Store to SONAR Compt
9.	OUTSIDE E/ROOM DOOR	01	Outside E/Room to Ships Galley, J/Rating Dining & Q/Deck
10.	E/ROOM	01	E/Room to Main Lobby

FIXED FIRE FIGHTING SYSTEM(CO2)

Ser	Place/Post	Qty	Rmks
1.	Q/DECK(BEHIND THE SHIPS GALLEY)	01	-

MAGAZINE SPRAYING AND FLOODING SYSTEM

Fwd Magazine

Aft Magazine

DAMAGE CONTROL GEAR ONBOARD SHIP

SER	NAME OF GEAR	QTY	RMKS
1.	ADJUSTABLE SHORING GEAR	04	-
2.	GUNTER BATTEN	01	-
3.	MEASURING TYPE	01	-
4.	WOODEN PAD	04	-
5.	RUBBER PAD	04	-
6.	CIRCULAR PAD	06	-
7.	SOFT PAD	02	-
8.	SPLINTER BOX	08	-
9.	STOPPER PLATE	02	-
10.	STORNG BACK PLATE	04	-
11.	J BOLT	08	-
12.	JUBILEE CLAMP	10	-
13.	EMMS CLAMP	04	-
14.	PIPE REPAIR CLAMP	06	-
15.	WEDGES	06 Pair	-
16.	DOG NAIL	03	-
17.	SCREW DRIVER	02	-
18.	BALL POINT HAMMER	01	-
19.	WOODEN HAMMER	02	-
20.	HAND SAW	01	-
22.	DAMAGE CONTROL BAG	01	-
23.	DAMAGE CONTROL BOOT	05 Pair	-

ANNEX H TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

LIST OF DIVING EQUIPMENT

Ser	Name of Items	Deno	Qty	Rmks
1.	Diving Set (Open Circuit)	NO	08	
2.	Depth Gauge	NO	03	
3.	Weight Belt	NO	03	
4.	Life Preserver	NO	08	
5.	Swim Mask with Snorkel	NO	08	
6.	Knife with Scabbard	NO	08	
7.	Swim Fins	Pair	08	
8.	Wet Suit	Pair	08	
9.	Diving Booties	Pair	08	
10.	Hand Gloves	Pair	08	
11.	U/W Torch	NO	03	

DETAILS OF HIGH PRESSURE AIR COMPRESSOR

Ser	Particulars	Description
1.	Name of Item	High Pressure Air Compressor
2.	Quantity	03
3.	GAUGE	Minimum 02 in no
4.	Equipment Brand	To be mentioned
5.	Equipment Model	To be mentioned
6.	Country of Origin (Main equipment)	To be mentioned
7.	Country of Manufacturer	To be mentioned
8.	Year of Manufacture including Spares	2025 or later

ANNEX J TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

MESS TRAPS, MESS UTENSILS AND GALLEY IMPLEMENTS

Ser	Name of Items	Deno	QTY	
			Ward Room	Sailors Mess
1.	Block Wood Chopping	No	0	1
2.	Chopper Meat 30 cm	No	2	2
3.	Chopper Meat 25 cm	No	0	1
4.	Chopper Meat 20 cm	No	0	2
5.	Colanders Aluminum	No	1	2
6.	Cooking Spud 91 cm	No	3	2
7.	Cooking Spud 111 cm	No	2	1
8.	Cooking Spud 137 cm	No	0	0
9.	Cooking Spud 152 cm	No	0	0
10.	Jug Aluminum 2 Ltr	No	1	0
11.	Knife Cook SS 15 cm	No	2	2
12.	Knife Cook SS 30 cm	No	0	2
13.	Knife Cook SS 35 cm	No	0	2
14.	Knife Cook SS 40 cm	No	0	1
15.	Knife Cook SS 45 cm	No	0	1
16.	Pan Frying 40 cm	No	2	2
17.	Pan Frying 60 cm (Diameter)	No	0	2
18.	Pan Frying 82 cm (Diameter)	No	0	2
19.	Piston & Mortar	No	1	1
20.	Pot- Cooking with Cover 15 cm x13 cm	No	2	2
21.	Pot- Cooking with Cover 25 cm x12 cm	No	2	3
22.	Pot- Cooking with Cover 28 cm x18 cm	No	2	4
23.	Pot- Cooking with Cover 35 cm x17 cm	No	2	4
24.	Pot- Cooking with Cover 45 cm x23 cm	No	2	4
25.	Pot- Cooking with Cover 51 cm x33 cm	No	0	4
26.	Pot- Cooking with Cover 65 cm x37 cm	No	0	2
27.	Pot- Cooking with Cover 66 cm x46 cm	No	1	3
28.	Strainer	No	1	3
29.	Tawa Iron 15 cm	No	1	4
30.	Tawa Iron 40 cm (Diameter)	No	0	4
31.	Tawa Iron 60 cm (Diameter)	No	0	2
32.	Tawa Iron 82 cm (Diameter)	No	0	0
33.	Weight Machine Spring 0-50 KG	No	1	1
34.	Weight Machine Spring 0-100 KG	No	0	0

Ser	Name of Items	QTY
1.	Bowl Salad	2
2.	Box Cash	1
3.	Cruets Set	2

Ser	Name of Items	QTY
4.	Cup Tea	12
5.	Dish Butter	2
6.	Dish Curry	2
7.	Dish Flat 30-31cm	2
8.	Dish Flat 35-36cm	2
9.	Dish Flat 40-41cm	1
10.	Dish Vegetable W/C	2
11.	Fork Dessert	12
12.	Fork Fish	5
13.	Fork Fruit	9
14.	Fork Serving	6
15.	Fork Table	12
16.	Knife Butter	2
17.	Knife Butter Spreading	3
18.	Knife Dessert	12
19.	Knife Fish	5
20.	Knife Fruit	9
21.	Knife Table	12
22.	Plate Breakfast	9
23.	Plate Dessert	12
24.	Plate Dinner	12
25.	Plate Pudding	5
26.	Soup Set	9
27.	Plate Quarter	12
28.	Pot Milk	3
29.	Pot Sugar	3
30.	Pot Tea	2
31.	Saucer Tea	12
32.	Sauce Boat	2
33.	Spoon Dessert	12
34.	Spoon Ice Cream	5
35.	Spoon Rice Serving	2
36.	Spoon Serving	6
37.	Spoon Soup	4
38.	Spoon Table	12
39.	Spoon Tea	12
40.	Blender Electric	1
41.	Board Paste Wooden	1
42.	Box Ice with Tong	1
43.	Brush Crumb	1
44.	Bucket Pantry Plastic	1
45.	Candle Stand	0
46.	Canister Sugar/Tea	2
47.	Cloth Table	10
48.	Coffee Maker Electric	1
49.	Colanders Aluminum	1
50.	Cup Ice Cream	10
51.	Cup Shrimp Cocktail	6

Ser	Name of Items	QTY
52.	Decanter	0
53.	Dish Chafing Double	2
54.	Dish Chafing Oblongs	0
55.	Dish Pie Aluminum	1
56.	Duster Blue Check	20
57.	Fork Carving SS-Wr	0
58.	Frill Cloth Navy Blue/White	0
59.	Gloves Hand White Cotton	4
60.	Goblet	10
61.	Ice Cream Scooper	1
62.	Juice Maker	1
63.	Jug Water-Glass	1
64.	Kettle Electric	1
65.	Kettle Tea Aluminum	1
66.	Knife Bread	1
67.	Knife Carving	0
68.	Machine Mincing	1
69.	Machine Potato Chipping	1
70.	Machine Potato Pinching	1
71.	Menu Stand With BN Crest	2
72.	Napkin Table	20
73.	Number Stand with Plastic Numerical	0
74.	Oven Electronic	1
75.	Potato Masher	1
76.	Pressure Cooker	1
77.	Sandwich Maker	1
78.	Sherry Glass (Toasting)	0
79.	Sieves Wire	1
80.	Slicer Egg	1
81.	Spoon Iron/SS Small	2
82.	Stone Curry With Roller	1
83.	Toaster Electric	1
84.	Toaster Rack 8 Partition	2
85.	Tin Flour/Atta/Rice With Cover	2
86.	Tray Serving Oblong	1
87.	Tub Washing	1
88.	Tumbler Table	20
89.	Waiter Round-25 cm	1
90.	Whisks EGG	1
91.	Air Pot 4 Ltr	2
92.	Bucket Pantry Aluminum 10-12 Ltr	1
93.	Bucket Pantry Aluminum 15-20 Ltr	0
94.	Cloth Table	25
95.	Cup Tea	90
96.	Laddle Cook Brass 30 Cm	2
97.	Laddle Cook Brass 45 Cm	2
98.	Laddle Cook Brass 76 Cm	1
99.	Laddle Cook Brass 91 Cm	0

Ser	Name of Items	QTY
100.	Laddle Cook Brass 121 Cm	0
101.	Saucer Tea	90
102.	Slicer Light Duty	1
103.	Slicer Heavy Duty	0
104.	Spoon Tea	90
105.	Spoon Serving Curry	3
106.	Spoon Dal Serving	6
107.	Spoon Rice Serving	6
108.	Spoon Vegetable Serving	3
109.	Water Glass SS	90
110.	Plate	90
111.	Tray	90
112.	Curry Bowl	90
113.	Dal Bowl	90
114.	BBQ Stand	1

ANNEX K TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

GEARS REQUIRED FOR RAS

Ser	Name of Items	Size	Qty	Remarks
1.	In Hull (Polyamide/Nylon)	L-90 m D-16 mm	01 no	
2.	Out Hull (Polyamide/Nylon)	L-130 m D-16 mm	01 no	
3.	Distance Line (Braided Polyester)	L-102 m. D-12 mm	01 no	
4.	Jack Stay (Man-made fiber)	L-146 m D-32 mm	01 no	
5.	Messenger Line	L-120 m. D-12 mm	01 no	
6.	Bolas/ Casting Gun Line	-	02 no	
7.	Helicopter Rescue Strop	-	02 no	
8.	Dumping Mat	-	01 no	
9.	Safety Net	-	01 no	
10.	Hazardous Duty Life Jacket	-	34 no	
11.	Safety Helmet	-	14 no	
12.	Night Distance Line with Electric cable	L-102 m. D-12 mm	01 no	
13.	Green Surcoat	-	01 no	
14.	Red Surcoat	-	02 no	
15.	Station Flag	3'x2'	02 no	
16.	Puma Plate	-	01 no	
17.	17 RAS Bag	-	01 no	
18.	Disk Red	-	01 no	
19.	Disk Green	-	01 no	
20.	Grommet Stopper	-	02 no	
21.	Traveler Block	-	01 no	
22.	Snatch block	-	04 no	
23.	Slip	-	02 no	
24.	Shackle straight	-	02 no	

GEARS REQUIRED FOR TOWING

Ser	Name of Items	Size	Qty	Remarks
1.	Casting Gun line/ Bolas line	-	03 no	
2.	Towing pendant	10 mtr	01 no	
3.	Towing chapping cable	32 mm 09 Mtr length	01 no	
4.	Towing slip	56 mm	01 no	

5.	Recovery rope	24 mm length 36 mtr	01 no	
6.	Towing hawser	8 inch length220 mtr	01 no	
7.	Screw flag	-	02 no	
8.	Signal disc (Red and Green)	-	01 no	
9.	Safety helmet (Fiber)	-	15 no	
10.	Emergency cutting gear	-	02 no	
11.	Hand Gloves	-	10 Pairs	
12.	Strong Bar	-	01 no	
13.	Seaman knife	-	01 no	
14.	Twin	-		

BERTHING HAWSERS

Ser	Name of Items	Size	Qty	Remarks
1.	Berthing hawser	L-50 m. D-6''	10 no	

ANNEX L TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF LPC FOR BN

DATA RHIB - TWIN ENGINE

Ser	Name	Data	Rmks
1.	Name	Rigid Hull Inflatable Boat (RHIB) with Twin Engine	
2.	Purpose	To use in Coastal Waters and open sea at all times of the year to perform following duties: a. SAR duties b. Fast Transportation (ship to ship and ship to shore) c. Boarding Operation d. Limited logistic support e. Constabulary duties like anti-smuggling, anti-piracy, and fishery protection	
3.	Brand	To be mentioned	
4.	Country (Origin)	To be mentioned	
5.	Manufacturing Country	To be mentioned	
6.	Year of manufacturing	2025 or later	
7.	Overall Length	4.9 - 5.10 m	
8.	Overall Width	2.2 – 2.5 m	
9.	Inside Length	To be mentioned	
10.	Inside Width	To be mentioned	
11.	Bouncy Tube Diameter	To be mentioned	
12.	Carrying Capacity	10 persons (Including 2 crew)	
13.	Speed	Not less than30 Kt	
14.	Endurance	Not less than100 NM	
15.	Sea Keeping Ability	Should be capable to operate in minimum sea state 3 (wave height 3-4 feet)	
16.	Navigational Equipment(GPS, Radar, Echo Sounder)	To be mentioned	
17.	Communication Equipment (VHF)	To be mentioned	
18.	Life Saving Equipment (Life Jackets, Emergency Flash Light/Gears)	To be mentioned	

ENGINE

Ser	Name	Data	Rmks
1.	Brand	Yamaha/Evinrude	
2.	Country of Origin	To be mentioned	
3.	Power	To attain desired speed and endurance	
4.	Starting Method	Electric	
5.	Fuel	Patrol/ diesel	
6.	RPM	To be mentioned	
7.	Weight	To be mentioned	
8.	Cooling Method	Water cooling	
9.	Fuel	To be mentioned	
10.	Lub Oil	To be mentioned	
11.	Consume Rate of Fuel	To be mentioned	
12.	Capacity of Fuel Tank	To be mentioned	