Khulna Shipyard Limited (KSY)
Bangladesh Navy (BN), Khulna-9201
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Project-717/Re-Tender/230 12 March 2025

INVITATION FOR EXPRESSION OF INTEREST (EOI)

Reference:

A. Invitation for Tender Number 44.08.2680.033.02.105.25.12 Dated 02 March 2025.

1. Khulna Shipyard Ltd (KSY) invites expression of interest (EOI) from reputed shipbuilder/ tenderer to work in Joint Venture (JV) for construction and delivery of 5 (five) in number Riverine Patrol Vessels (RPV) for the procuring entity as per Reference A. Brief description of the project is as follows:

a. **Project Description.** Construction and delivery of 05 x Riverine Patrol Vessels (RPV).

b. **Quantity.** 05 (Five) in number.

c. **Construction Material.** The proposed RPV shall be constructed as follows:

(1) Hull structure shall be class approved Steel of Marine Grade AH 32 or AH-36 for hull construction.

(2) Superstructure shall be of shipbuilding quality class approved marine grade aluminium Alloy plate of 5083 and 6082 (for hull extrusion) or equivalent/higher.

d. **Classification Standard.** A classification society from LR/DNV/GL/BV shall be appointed for Approval of relevant drawings, construction supervision/inspection and certification.

e. **Country of origin and manufacturer of all equipment, machinery, shafting, weapon, sensors, power generation and distribution.** As stated in the respective item's description in the technical specification.

f. **Design.** The offered RPVs design should comply following criteria:

(1) Design of the RPVs shall be from USA, UK, EU Countries, Canada, Turkey.

(2) The RPV shall be designed based on proven hull design. Maximum 10% deviation in dimensional parameters may be allowed with CFD analysis. Detail CFD analysis shall be provided while signing the contract with the procuring entity.

(3) The proven design shall mean at least 3 x proven design ships already built and satisfactorily operated by any/ different navy or coast guard or government maritime security agency.

(4) All machineries and equipment with accessories shall be of most current design.

(5) All machineries and equipment shall be designed, manufactured and installed in accordance with the requirement of International Association of Classification society (IACS) member rules.

2. **Basic Technical Specification of RPV**.

a.	Length OA	:	35 to 45 meters (To be mentioned).
b.	Breadth (max)	:	6 to 8 meters (To be mentioned).
c.	Depth	:	To be mentioned
d.	Max. Draught (Full Load)	:	Not more than 2.5 meters.
e.	Maximum Speed	:	Not less than 22 knots (at Normal Load/ Standard Load with 50% Fuel, 50% Water and 100% Crew).
f.	Cruising Speed	:	Approx. 15 knots.
g.	Endurance	:	Approx. 1500 Nautical Miles.

3. **Delivery Schedule**. 05 x RPVs are to be constructed, test and trial to be completed and delivered within 24 months from the contract signing date by 30 June 2027

4. **Qualification of Bidder**.

a. The bidder should be capable of supplying the design package (including construction supervision), material package including Gun, Weapon, Sensors, ammunitions, etc. as per the technical specification of the procuring entity up to KSY premises.

b. The bidder must be reputed and financially sound to comply para-4.a.

c. The bidder must not have any litigation claim from any organization.

d. The bidder should have experience in supplying ship design and material package/ shipbuilding.

e. The required average annual turnover of the bidder shall be greater than BDT 400 (Four hundred) Crore or equivalent foreign currency (USD/EURO/GBP/JPY) over the last 3 (Three) years or best 3 (Three) years in the last 5 (five) years.

f. The bidder should have import/ export registration certificate (as applicable).

g. The bidder should have Valid Trade License or equivalent license (as applicable).

h. The bidder should have VAT/ Business Registration Certificate (as applicable).

i. The bidder should have Updated TIN/ equivalent certificate and Tax Payment Certificate (as applicable).

j. The bidder must have Bank Solvency Certificate.

5. **Payment Terms**. Payment shall be made after receiving from the Procuring Entity as per payment schedule and will be released as per the final agreement.

6. **Scope of Supply of JV Partner.**

a. Maintain liaison with Procuring Entity and KSY.

b. Complete design package as per attached technical specification (Enclosure-3).

c. Classification fees (Design approval & Construction Supervision).

d. Complete Material, Equipment and Machinery package including Gun, Weapon, Sensors, ammunitions, etc. as per Technical Specification (Enclosure-3) of the procuring entity. Installation, test-trial, commissioning, training, FAT/ PSI (as applicable) of all the supplied items will be the responsibility of JV Partner.

e. Material, Equipment and Machinery package including Gun, Weapon, Sensors, ammunitions, etc. as per the Technical Specification (Enclosure-3) have to be supplied at KSY premises. In this regard, LC will be opened in the name of KSY and JV partner will bear all expenses related to LC Charges, LC Margin, LC amendment Cost, LC Confirmation Cost (if any), Marine insurance, Custom duty, C&F agent Commission, Port charges, Transportation cost, etc.

f. All financial cost (Tender security, Performance Guarantee, Advance Payment Guarantee, Bank Guarantee (if any), Bank guarantee for warranty, insurance for LC, etc.) to be borne by the JV Partner.

g. During implementation of the project, if any Liquidated Damage (LD) is imposed on KSY due to delay arrival or short supply of material by the JV Partner, the same will be imposed on the JV Partner.

h. If any speed penalty is imposed on KSY due to less speed as mentioned in the technical specification, the same will be imposed on the JV Partner.

i. Cost of Fuel oil, Lub oil, Grease, Coolant, Crew Fooding on board etc. during test-trial and delivery will be borne by the JV Partner.

j. All charges related to Boarding, Lodging, Fooding, Medical Support, transportation etc. of OEM Engineers/ Foreign Experts will be borne by the JV Partner.

k. The price to be quoted as per Bill of Quantity (BOQ) attached as Enclosure-4.

7. **KSY Scope of Supply**. Items/ materials, workmanship and services as mentioned in Enclosure-2 will be provided by KSY.

8. Cut-off date for Submission of offer: **03 April 2025 at 1200 hrs BD time.**

9. Offer validity: 180 days after submission.

10. Following email address will be used for document submission /correspondence:

a. For Technical: contact@khulnashipyard.gov.bd
plans@khulnashipyard.gov.bd

b. For Financial: ksygmdnp@gmail.com

11. Interested Shipbuilder/ Tenderer is hereby requested to contact following person:

Md. Hasanuzzaman Tarek
Deputy Chief Engineer
Design & Planning Department
Khulna Shipyard Ltd., Bangladesh Navy Khulna-9201
Cell: +8801670715428 (whatsapp)
Email: contact@khulnashipyard.gov.bd
plans@khulnashipyard.gov.bd

MD. JULHASH UDDIN AHMED
Captain BN
For Managing Director

Enclosures:

1.	General Instruction for Submission of EOI	-	04 (Four) Pages.
2.	Scope of Supply of KSY	-	02 (Two) Pages.
3.	Technical Specification	-	110 (One Hundred Ten) Pages.
4.	Bill of Quantity (BOQ)	-	52 (Fifty Two) Pages.
5.	Declaration Form	-	01 (One) Page.

GENERAL INSTRUCTIONS FOR SUBMISSION OF EOI FOR 5 IN NUMBER RIVERINE PATROL VESSELS (RPV)

1. In Pursuant to the EOI at Reference A, the general instructions regarding submission of EOI are appended below:

a. The supplier/ principal is to provide followings for which the EOI is invited:

(1) **Design Package**. The complete design and drawing package from a reputed shipbuilder/ tenderer either directly or through their authorized agent are to be submitted.

(a) The RPV shall be designed based on proven hull design. Maximum 10% deviation in dimensional parameters may be allowed with CFD analysis shall be provided while signing the contract.

(b) The proven design shall mean at least 3 x Proven design ships are already built and satisfactorily being operated by any/ different navy or coast guard or government maritime security agencies.

(c) All machinery and equipment shall be designed, manufactured and installed in accordance with the requirement of International Association of Classification Society (IACS) member rules.

(d) The RPV shall be designed and constructed as per the latest naval ship design criteria and standards with respect to subdivision stability, structures, shock, vibration, noise, EMI, fire-fighting and vital systems.

(e) Vital systems such as propulsion, electric plants and navigation and communication system are to be according to class rule.

(2) **Material Package**. All material (except items mentioned in KSY Scope of Supply – Enclosure 2), machinery and equipment required for construction shall be supplied to meet the technical requirement by the purchaser. If any item is to be purchased by KSY locally, those are to be listed and submitted with the offer. Detail BOQ (Enclosure-4) is to be submitted with equipment name, model, country of origin & country of manufacturer.

(3) **Technical Assistance**. Five vessels will be made in a single batch. Technical assistance is to be provided, which shall cover the fabrication supervision, equipment installation, commissioning of major equipment, test-trial and training as and when required for the vessels.

b. **Selection Criteria.** The participants are to submit both technical and financial offer in complete. The offers which will be technically suitable will be considered for financial selection process. However, company profile and earlier experiences will also be a prime factor to select the suitable JV Partner. Upon submission of complete documents, the final bidder (most responsive) will be selected based on both technical and financial offer.

2. The following Technical documents are to be submitted with offer:

a. Drawing and Documents of Offered Vessel.

(1) Detail technical offer with clause-by-clause comments and catalogue.

(2) Ship power VS Speed with fuel consumption calculation are to be submitted with the offer. It shall be finalized after model test. The bidder has to submit preliminary Power VS Speed calculation.

(3) Detail technical offer with Catalogue/ Manuals of the following Main Equipment is to be submitted {ITT Cl. 24.3(4), 31.1(e)}:

a) Main Engine

b) Gen-Set

c) Propulsion System

d) Steering System

e) Bridge Equipment

f) Electrical Equipment

g) Navigation Equipment

h) Hydraulic Equipment

i) Pumps and Motors

j) Anchor Windlass

k) Capstan etc.

(4) Equipment shipment schedule.

(5) Proposed technical specification along with country of origin and country of manufacture of the equipment to be submitted.

(6) Speed vs Power calculation.

(7) Fuel Consumption with curve in Ltr/hr of Main Engine at cruising speed.

(8) Fuel Consumption in Ltr/hr of Generator engine at 75% & 100% load.

(9) Clause by clause comments of technical specification must be submitted.

(10) Complete technical specification/ Compliance sheet of the offered RPV's (Sec. 7, Art. 104.c).

(11) Preliminary General Arrangement (GA) Drawing of the offered RPV's (Sec. 7, Art. 104.c).

(12) List of RPV/ LPC/ PC built so far by the shipbuilder with the names of owners and their present contact address (Sec. 7, Art. 104.d).

(13) Delivery schedule (with reference to the date of contract effecting) of the drawings, material and machinery, equipment, weapons. sensors and other items for construction of 05 in number RPV (Sec. 7, Art. 104.e).

(14) Production schedule for construction (especially major events related to the payments terms mentioned in the tender specification) (Sec. 7, Art. 104.f).

(15) A set of design calculations and drawings of the RPV need to be submitted, which may include the following drawing (Sec. 7, Art. 104.g):

a) Tanks (POL, Fresh water, ballast etc.) layout Plan with capacity.

b) Trim and Stability Booklet.

c) Damaged Stability Booklet.

d) Endurance and Sustainability Calculations.

e) Layout of armaments (with firing arc) and Magazines.

f) Arrangement of accommodations.

g) Arrangement of Machinery-plan View.

h) Arrangement of Main Shafting.

i) Ventilation and Air Conditioning Diagram.

j) Arrangement of Electrical/ Electronic Equipment.

k) Electrical Load Analysis.

(16) Original certificate of providing after sales warranty supply of spare and others services for complete package of supply (Sec. 7, Art. 104. h)

(17) The Supplier will have to give guarantee that supplied propulsion machinery will enable the ship to achieve maximum speed and maximum continuous speed of RPV's (Section 7. Art 110)

(18) Special terms/conditions to be incorporated in the Contract and to be adhered by the supplier at the time of signing of the Contract. The supplier or their authorized Principal/ Agent is to clearly state their agreement to these terms/ conditions while submitting the offer (Section 7. Art. 112).

(19) Detail paint scheme for different areas of the RPV is to be submitted (Sec. 7. Art. 323).

(20) A plan for doors, windows, port lights, deck openings, etc. in details is to be submitted (Sec. 7, Art. 413).

(21) Record of sales of main engine quoted model indicating user and type of ship is to be mentioned with the quotation (Sec. 7, Art. 505).

(22) Type approval certificates from classification society for the engines, gearboxes and auxiliaries are to be provided (Sec. 7, Art. 509).

(23) Specific fuel consumption curves of engines are to be provided (Sec. 7, Art. 511).

(24) The necessary load calculation and load management information for sea and harbour are to be submitted (Sec. 7. Art. 602).

(25) Electrical load analysis in different conditions (Sec. 7, Art. 504).

(26) Guarantee of unrestricted supply of spare parts for at least 15 years (Sec. 7, Art.1101).

(27) Photograph of proven vessel.

b. Article wise Compliance Statement based on Technical Specification (Sec. 7: Art. 114)

c. **Classification (Sec. 7, Art. 125)**. The RPV must be built according to an internationally recognized classification society's warship building standard (Lloyds/DNV/GL/BV). The classification society referred here must possess the following criteria:

(1) Classification society for the construction of RPV must be a permanent member of IACS.

(2) Classification society will be from Lloyds/ DNV/GL/ BV.

(3) Class Notation: I ✠ HULL • MACH.

d. Manufacturer's authorization in original for following items are to submitted:

(1) Designer Authorization.
(2) Main Engine.
(3) Generator Sets.

3. Following terms & conditions are need to be considered while submitting financial offer:

a. Following items are to be included with financial offer:

(1) All necessary design drawings required for class approval and construction of the vessel.

(2) Production and spool drawing.

(3) All necessary material, machinery, equipment, gun, weapons, sensors, etc. as per technical specification.

(4) Item wise price offer as per Bill of Quantities.

(5) List of OEM recommended spare parts along with item wise price for 05 (five) years operation are to be submitted as mentioned in article with the quotation (Sec. 7, Art. 1101).

(6) Cost of FAT/ PSI for main engines, generators, Guns, Radar, etc. to be borne by supplier. Foreign design package supplier should arrange a visit for purchasing representative to design package material supplier's premises before signing the contract. In addition to the purchaser representative at least 02 (two) KSY personnel will attend with each FAT/PSI (Section 6 BOQ: SL. 460).

(7) Two (02) in no replica/ model of offered vessel in scale of 1:50 of original dimensions in standard packing case.

(8) Technical Assistance.

b. If KSY has to supply any items, the details of such items are to be listed and attached with financial offer. Non submission of such list will be considered as no local items are needed to be supplied by yard and material package include all required items.

5. **Miscellaneous**. Followings to be noted:

a. The shipbuilder/ tenderer's authorized representative should sign the declaration form and submit the same with financial offer.

b. If awarded, the supplier must be ready to sign the JV contract within 15 days of issuance of letter.

c. Without signed declaration form and other documents which are instructed to submit with the offer, the offer will not be considered as a complete one, hence will not be considered as responsive.

d. No offer will be accepted after the cut-off date and time.

KHULNA SHIPYARD LIMITED BANGLADESH NAVY KHULNA

Enclosure-2

SCOPE OF SUPPLY

1. Maintain liaison with Procuring Entity and JV partner.

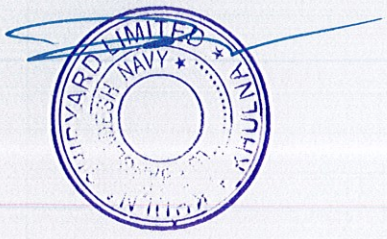
2. Design Package, Construction Supervision and Material package including Gun, Weapon, Sensors and ammunitions as per Technical Specification of the procuring entity have to be supplied by the JV Partner up to KSY premises. However, items /materials, workmanship & services mentioned in the paragraph 4 below will be supplied by KSY.

3. LC will be opened in the name of KSY and JV partner will bear all expenses related to LC Charges, LC Margin, LC amendment Cost, LC Confirmation Cost, Marine insurance, Custom duty, C&F agent Commission, Port charges, Transportation cost etc. All financial cost (Tender security, Performance Guarantee, Advance Payment Guarantee, Bank Guarantee (if any), Bank guarantee for warranty, insurance, etc.) to be borne by the JV Partner.

4. The following items /materials, workmanship & services will be supplied/ borne by KSY:

Ser	Description
1	Tax and VAT at the times of Bill Payment
2	KSY labour Cost for Construction of Vessel
3	Consumable materials like electrode, gas, grinding stone for construction purpose
4	Crane Facility
5	Forklift facility
6	Heavy Load Transporter
7	Power Operated Trolley
8	Scafolding
9	Electric Blower Service
10	Electric Motor Compressor
11	Welding Machine
12	Cutting Machine
13	Grinding Machine
14	CNC Machine
15	Lathe Machine
16	Bending Machine
17	Laser Theodolite
18	CNC Pipe Bending Machine
19	Rudder Boring Machine
20	Shaft Boring Machine
21	Drilling Machine
22	Berthing Charge
23	Drawing Printing
24	Tender Preparation Cost
25	Jig Fixure
26	NBCD, Location and Risk Marking

Ser	Description
27	Mooring/ Berthing Facility
28	Launching
29	Docking/ Undocking, If Required
30	Operators Service (Crane, CNC, Fork Lifter, etc)
31	KSY QC Supervision Service
32	Electricity
33	Internet, Internal Telephone, Cable TV facility
34	Water
35	Fabrication shade (LXB=100mX70m)
36	Storing Facility of Main Store
37	Safety Equipment
38	Fire Security
39	Post Sentry
40	Accommodation, fooding. Office, Recreation Facility for Ship's Crew
41	Stationary items for Training of Ship's Crew
42	Accommodation, fooding, Office, Recreation, Telephone for PIT
43	Location and Access Closure Marking for Hull Designation
44	Transportation for PIT (Local)
45	Keel Laying Ceremony cost
46	Launching Ceremony cost
47	Handing Over Ceremony Cost
48	KSY Space rent
49	Blasting and Paint Application
50	Material Over Head cost
51	Location and Access Closure Marking for Hull Designation
52	Cost of Inclining Experiment



Enclosure-3

Section 7
General Specifications

TECHNICAL SPECIFICATION FOR CONSTRUCTION OF 05 X RIVERINE PATROL VESSEL (RPV)

TERMS AND CONDITIONS

101. **Preamble**. 5 (Five) in numbers Riverine Patrol Vessel (RPV) will be constructed for Bangladesh Coast Guard (BCG) at competent shipyard of Bangladesh having experience of at least **10 years** in shipbuilding/ship construction. The offered RPVs will be of proven design or based on a proven design. Well established local shipbuilders/Tenderer in Bangladesh having experience of building class approved patrol craft/ warship for Navy or Coast Guard, can submit offer/ quotation.

102. **Scope of Construction**. The whole project of RPVs construction will be executed in the following manner:

a. Shipbuilder/Tenderer shall provide design and material package from any reputed foreign shipbuilder/foreign design and material package supplier for all required items like design, drawing, constructional materials, propulsion and auxiliary machinery, 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.

b. Local Shipbuilder/Tenderer will construct, equip and complete the RPVs in all respect under the supervision of the classification society surveyor and BCG project implementation team.

103. **Work Involvement of the Parties Involved**.

a. **Bangladesh Coast Guard (BCG)**. The responsibilities of BCG will be as follows:

(1) To approve technically suitable offer from the Shipbuilders / Tenderer.

(2) To employ a project implementation team (PIT) at the Builder's premises.

(3) To approve General Arrangement (GA) drawing, Compartment Arrangements (layouts), tank arrangements, firing arcs of weapons, hydrostatic curves, shell expansion drawing etc. drawings as regards to production.

(4) To observe test & trial of the RPVs conducted by the Tenderer and experts of OEM or their authorized local agent as appropriate.

(5) To accept the RPVs as per contract.

(6) "Test and trial completion certificate" is to be jointly signed by The Tenderer/Local Shipbuilder and BCG.

b. **The Shipbuilder**. The shipbuilder will be responsible for the following the completion and delivery of all goods as per contract. However, few specific scopes are explained below:

(1) To propose appropriate offer to BCG for approval.

(2) To construct hull and structure of the RPVs under supervision of classification society surveyor and Project Implementation Team (PIT).

(3) To supply and install all machinery, equipment (including all communication & navigation equipment such as radar, gyro compass, echo sounder etc.) and fittings under the assistance/supervision of the OEM/ concerned supplier of the machinery as necessary.

(4) To supply and install Guns under the assistance/supervision of the OEM/concerned supplier. Necessary drawings, instructions, special tools/instrument and guidelines will be provided by the OEM/ concerned supplier.

(5) To assist in/perform conducting test, trial and commissioning of all machinery, equipment, fittings, sensors, weapons and systems as necessary.

(6) To deliver the RPVs to BCG as per contract.

(7) "Test and trial completion certificate" is to be jointly signed by Shipbuilder and BCG.

(8) Shipbuilder shall provide construction supervision technician from foreign shipbuilder at construction site during construction of RPVs as required if, the foreign shipbuilder is both design and material package supplier.

c. **Foreign shipbuilder/Foreign Design and Material Package provider (Foreign)**. Foreign shipbuilder/foreign design and material package supplier shall supply followings to local shipbuilder:

(1) To provide design and drawing package of the offered RPVs.

(2) To provide full set of preliminary and production drawing of the RPVs.

(3) To supply all materials, equipment, machinery and fittings (except those specified as BCG and the Shipbuilder's supply) as stated throughout this tender specification those are required for construction of the RPVs but not limited to the following:

(a) Propulsion plants including propulsion engines, gearboxes, engine control system, propellers, propeller shafts, shaft bearings, shaft seals, stern tubes, A brackets, Plummer blocks etc.

(b) Electrical power generator sets including switchboards, power distribution boards/panels, lighting system, emergency power supply system, conversion machinery, batteries, cables etc.

(c) Supply all required equipment/items for external and internal communication including HF, VHF, Walkie-talkie sets etc.

(d) Supply of all weaponry & sensors such as 30 mm gun, 12.7 mm gun with base.

(e) Supply all necessary ammunition, target, test equipment and expert personnel services required for successful test/trial of weaponry/sensors.

(f) Lifesaving equipment, ship's boat, boat hoisting crane, capstan and other deck fittings.

(g) Anchors, chain cables, bollards, fair leads. (Local shipbuilder/Tenderer may also source).

(h) Auxiliary machinery including all types of pumps, air compressors, seawater and fresh water hydrophone systems, fittings etc.

(j) Steering system.

(k) Fixed fire-fighting systems.

(l) Supply exhaust blowers for machinery spaces, galley, living and sanitary spaces. Ventilation and air conditioning system including air conditioning plant, trucking/ducting, fans, blowers, etc.

(m) Hot plates, rice Cookers, ovens and other galley fittings must be marine type.

(o) Navigational equipment.

(p) Disposal of oily water i.e. Oily water separator, etc. as per MARPOL rule/ regulations.

(q) Lifesaving equipment such as life raft, life buoy with marker, General Service Life Jacket, Hazardous Duty Life Jacket, EPIRB, SART etc.

(r) Electric cables, guard rails, paneling, sound and heat insulation material, scuttles, windows, doors, etc.

(4) To propose other requirement/specifications of items as considered essential for the offered RPVs.

(5) To carryout speed/performance test of the RPVs, as well as, test/trial and commissioning of all machinery, equipment, weapons, sensors and system.

(6) To arrange operation and maintenance training for the ship's crew. The training should cover all aspects of operation and 2nd level maintenance of all machinery, equipment, weapons and system on board.

(7) To supply all required books, manuals, drawings, catalogues, circuit diagrams and other documents of all machinery/equipment and item in English.

(8) To supply all necessary certificates along with class notation required by the classification society for the purpose of classification of the vessels and their machinery/equipment.

(9) To supply all tools, test equipment and recommended spare parts for 05 (five) years.

(10) To arrange shipment/ transportation of all equipment/items/ spares. All costs related to shipment/transportation, packaging, and all handling charges outside Bangladesh are to be borne by the foreign material package supplier/ foreign shipbuilder or their authorized Principal/ Agent.

(11) "Test and trial completion certificate" is to be jointly signed by the Tenderer / Local Shipbuilder and BCG.

(12) To provide one-year warranty for all equipment of the ship after handing over to BCG.

(13) To provide construction supervision technician from foreign shipbuilder at construction site during construction of RPVs.

(14) To provide any item/ interface/ arrangement required for the standard operation of equipment/system/weapon whether it is mentioned or not.

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

a. Complete technical specification of the RPV as per annex B of this tender specification.

b. The RPV shall be designed based on proven hull design. **Maximum 10% deviation** in dimensional parameters may be allowed with CFD analysis. Detail CFD analysis shall be provided while signing the contract.

c. Preliminary General Arrangement (GA) drawing of the offered RPVs.

d. List of LPCs/ PCs built so far by the shipbuilder with the names of owners and their present contact address.

e. Delivery schedule (with reference to the date of contract effecting) of the drawings, material and machinery, equipment, weapons, sensors and other items for construction of 05 in number RPVs.

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

g. A set of design calculations and drawings of the RPV need to be submitted, which may include the following drawings:

(1) Tanks (POL, Fresh water, ballast etc.) layout Plan with capacity.
(2) Trim and Stability Booklet.
(3) Damaged Stability Calculations.
(4) Endurance and Sustainability Calculations.
(5) Layout of armaments (with firing arc) and Magazines.
(6) Arrangement of accommodations.
(7) Arrangement of Machinery-plan View.

(8) Arrangement of Main Shafting.
(9) Ventilation and Air Conditioning Diagram.
(10) Arrangement of Electrical/Electronic Equipment.
(11) Electrical Load Analysis.

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

j. Before submission of quotation, a pre-bid meeting will be held in BCGHQ.

105. **BCG Project Implementation Team (PIT) and Crew at Construction Site**. A project implementation team consisting of at least 3 X BCG representatives (1X Lt Cdr, 2X BCG staff) will remain at the construction site throughout the period of ship construction. Tenderer /Shipbuilder will provide following facilities to BCG personnel during their stay at shipyard:

a. Private office room at or in the immediate vicinity of the shipyard with necessary office materials including high configuration latest generation laptop computer, external hard disk, pen drive, internet facilities, color printer, scanner, paper shredder etc.

b. Internal transportation for the project purpose and accommodation facility for the PIT at Shipyard.

c. Food and Accommodation facilities (non-family, including Cooking facilities) for the total ship's crew during training till handing over the RPVs to BCG.

106. **Terms of Payment**.

a. BCG reserves the right to accept the whole or part of the offer considering the economic viability.

Payment Schedule. Mode of payment shall be through bills/documents submitted by the Shipbuilder/Tenderer to the Purchaser. Payment of local currency (BDT) portion shall be made in Bangladesh Taka. Payment of foreign currency portion shall be made in contracted currency. Payment shall be made for offered foreign currency through an irrevocable confirmed letter of credit (LC) opened in favor of the Builder in a scheduled bank of Bangladesh. The necessary expenses to open the Letter of Credit will be borne by the Buyer.

All the payment shall be made as per the following terms of payment:

(1) **1st Installment.** The 1st instalment amounting to 10% of the contract price shall be paid on signing of the contract and upon submission of a Bank Guarantee (BG) in a scheduled bank of Bangladesh equivalent to 10% of the contract price. This BG shall remain valid till the payment of 3rd Installment as per payment schedule.

(2) **2nd Installment.** The 2nd instalment amounting to 10% of contract price shall be paid after submission of GA Drawings (with dimensions, Tank Capacity plan, Arrangement of Accommodation, Arrangement of Machinery plan and approved by BCGHQ) and Keel laying. The copy of the certificate (keel laying) issued by shipbuilder and Classification Society in this effect and endorsed by BCG representatives.

(3) **3rd Installment.** The 3rd instalment amounting to 15% of the contract price shall be paid after receiving shipping documents of hull material package

shipment at shipyard and Purchase Order copies for procurement of major machinery/ equipment (main engines, gear box, generators) for all RPVs and endorsed by the BCGHQ.

(4) **4th Installment.** The 4th instalment amounting to 15% of contract price shall be paid after receiving shipping document of major machinery/ equipment (main engines, gear box, generators) of all RPVs, construction of first 3x RPVs up to main deck level and submission of Purchase Order copies of all guns and sensors.

(5) **5th Installment.** The 5th instalments amounting to 10% (2% for each RPV) of contract price shall be paid upon construction of remaining 2xRPVs up to main deck level, completion of superstructure construction of 3x RPVs and submission of shipping documents of all guns and sensors

(6) **6th Installment.** The 6th instalments amounting to 15% (3% for each RPV) of contract price shall be paid upon Completion of Superstructure Construction of 2xRPVs and successful launching of 3x RPVs.

(7) **7th Installment.** The 7th instalment amounting to 10% (2% for each RPV) of contract price shall be paid for RPVs upon successful Launching of remaining 2x RPVs and completion of test trial of 3xRPVs.

(8) **8th Installment.** The 8th instalment amounting to 15% (3% for each RPV) of contract price shall be paid upon completion of Test/ Trial of remaining 2x RPVs, final acceptance and successful delivery of 5x RPVs.

b. **Price Adjustment**. The contract may be subjected to price adjustment in accordance with relevant provisions of PPR-2008.

c. **Currency**. All payments from PURCHASER to TENDERER/LOCAL SHIPBUILDER shall be in local/foreign currency, as applicable.

107. **Delivery Schedule**. 05 x RPVs are to be constructed, test and trial to be completed and delivered within **24 months** from the contract signing date **by 30 June 2027.**

108. **Guarantees**.

a. **Bank Guarantee (BG)**. The Shipbuilder/Tenderer shall submit a BG for an amount equivalent to 10% of the contract price. The BG shall be issued from any scheduled bank of Bangladesh in favor of Director General Bangladesh Coast Guard. This BG shall remain valid till the payment of 3rd Installment as per payment schedule.

b. **Performance Guarantee (PG)/Performance Security (PS)**. The Tenderer shall submit a PG prior signing of contract for an amount **equivalent to 10% of the contract price** in any scheduled bank of Bangladesh in favor of Director General Bangladesh Coast Guard. This PG shall remain valid till completion of Test/Trial, final acceptance and successful delivery of 5x RPVs.

c. **Guarantee for Warranty**. The Tenderer shall submit a **Guarantee for Warranty** after final acceptance and successful delivery of 5x RPVs for an amount equivalent to 2.5% of the contract price in any scheduled bank of Bangladesh in favor of Director General Bangladesh Coast Guard. This **Guarantee for Warranty** shall remain valid till the completion of warranty period as per PPA 2006 and PPR 2008.

109. **Warranty Repair/Replacement**.

a. The Tenderer shall undertake the full responsibility to rectify, any defect in any of the RPV(s) which is due to defective material, construction, miscalculation and/or improper workmanship on part of Shipbuilder/Tenderer and/or its subcontractors, or to replace any such defective item, equipment and machinery, provided that the defects are revealed/discovered during the period of 12 (twelve) months after acceptance of each RPVs at Shipbuilder/Tenderer's expense. Warranty repair/replacement shall be accomplished within 01 month of notification of the relevant defect. If any equipment or machinery remains non-operational for a certain period within warranty, the warranty will be extended by the same period for that equipment only. However, if the ship remains non-operational for the defect of any equipment warranty period of the RPV shall be extended.

b. In the event of any item of 5X RPVs supplied against the contract found to be contrary and not in accordance with the contract during the inspection at the consignee's premises by BCG Project Implementation Team, the Tenderer/Shipbuilder will make repair/replacement free of cost within 03 months from the date of receipt of reports from the consignee/BCG Project Implementation Team, without involving any extra cost to the Purchaser. But the Purchaser will have to forward such report to the Tenderer/Shipbuilder. Even after the repair, if the items are not found satisfactory, such item(s) will be replaced by the Tenderer/Shipbuilder at Tenderer/Shipbuilder's cost (i.e., freight, insurance and charges if any). The Tenderer/Shipbuilder is to arrange dispatch of the unsatisfactory item(s) after necessary co-ordination with the purchaser.

110. **Insufficient Speed**

a. The Tenderer/Shipbuilder will have to give guarantee that the supplied propulsion machinery will enable the ship to achieve maximum speed and maximum continuous speed of RPVs.

b. In case the RPVs fail to achieve the maximum speed and maximum continuous speed as stated in the contract specification, then penalties will be imposed on the Tenderer/Shipbuilder for non-compliance of the contract as per the following:

Ser.	Speed Deficiency from that of mentioned in the contract specification	Penalty counted in % for each RPV contract value for Speed Deficiency for each
1.	0.10 to 0.49 knot	0.5%
2.	0.50 to 0.99 knot	1%
3.	1.00 to 1.49 knots	1.5%
4.	1.50 to 1.99 knots	2%
5.	2.00 to 2.49 knots	2.5%
6.	2.50 to 2.99 knots	3%

c. If the deficiency in actual speed of the RPVs is more than 3.0 (three) full knots below the speed guaranteed in the offer, then BCG, at its option, may, subject to the Tenderer/Shipbuilder's right to effect alternations or corrections or cancel the Contract.

111. **Sea Trial Condition**. Sea condition for speed trial will be Maximum Sea State 2, Max Beaufort Scale 2, Minimum depth 15 meter.

112. **Special Terms**. Special terms/conditions to be incorporated in the Contract and to be adhered to by the Shipbuilder/Tenderer at the time of signing of the Contract. The Shipbuilder/Tenderer or their authorized Principal/Agent is to clearly state their agreement to these terms/conditions while submitting the offer.

113. **Condition for Acceptance of Quotation.** Quotation has to have supported documents (all required certificates as mentioned before, booklets, leaflet, catalogue, brochure etc.) having detailed particulars of the intended ship, its machinery, equipment's, fittings, fixtures, accessories, spare parts etc. If detailed information regarding intended ship and its machinery, equipment's, fittings, fixtures, accessories, spare parts etc. are not provided; the quotation will not be accepted.

114. **Compliance Statement.** A compliance statement fulfilling all the requirement of the tender is to be submitted for evaluation of the quotations. Stating mere "Yes" or "No" will not suffice. The Shipbuilder/Tenderer should clearly mention whether the offer of that article comply with the requirement of the Purchaser or not. Therefore, detailed compliance statement supported by appropriate documents is to be submitted in a tabular format. An incomplete compliance statement may attribute to cancellation of the offer.

115. **Article wise Compliance Sheet.** Article wise compliance on the purchaser's Technical Specification of RPVs is to be provided. The Shipbuilder/Tenderer should clearly mention whether they comply with the requirements/offers of the purchaser mentioned in the various articles of the tender specification or not. Any deviation is to be clearly mentioned in the offer.

ANNEX B

DETAILED TECHNICAL SPECIFICATION FOR CONSTRUCTION OF 5 (FIVE) RIVERINE PATROL VESSELS (RPV) FOR BANGLADESH COAST GUARD (BCG)

CONTENTS

SECTION–I of ANNEX B

INTRODUCTION AND GENERAL PROVISIONS

101. **Functions**.

a. **Primary**. Patrolling in the Inland waters and adjacent coastal areas at sea for law enforcement and to provide support for other Coast Guard vessels in coastal areas.

b. **Secondary**. Conduct search and rescue and small-scale pollution control in Inland waters and adjacent coastal areas at sea.

102. **General Descriptions**.

a. Should be capable to operate in tropical conditions.
b. Have an expected life of 30 years.
c. Annual usage of approximately1500 hours.
d. Normal refit interval of once in 2 years and docking after at least 3 years.
e. Each mission Length: 10 days.

103. **Displacement**.

a. Full Load (100% POL, 100% Water and 100% Crew, 100% stores etc.): Not less than 200 Tons (To be mentioned)
b. Normal Load and Standard Load (50% POL, 50% water, 100% Crew): To be mentioned
c. Light Weight Ship: To be mentioned

104. **Dimensions**.

a. **Length (overall)** : 35 to 45 meters (To be mentioned)
b. **Breadth (max)** : 6 to 8 meters (To be mentioned)
c. **Depth** : To be mentioned
d. **Maximum Draft (full load)** : Not more than 2.5 meters
e. Drafts to be mentioned as follows:

(1) Draft Fwd (including projection) - To be mentioned
(2) Draft Fwd (excluding projection) - To be mentioned
(3) Draft Aft (including projection) - To be mentioned
(4) Draft Aft (excluding projection) - To be mentioned
(5) Draft (propeller) - To be mentioned

105. **Speed**.

a. **Maximum speed.** Not less than 22 knots (at Normal load/Standard Load with 50% fuel, 50% water, 100% Crew).

b. **Maximum continuous speed**. To be Specified according to design.

c. **Cruising/ Economic speed**. 15 knots (Approx). To be mentioned.

d. **Endurance**. Approximately 1500 Nautical miles. To be specified according to design

106. **Country of Origin and Manufacturer of All Equipment, Machinery, Shafting, Weapon, Sensors, Power Generation and Distribution**. As stated in the respective item's description.

107. **Design of RPVs. USA, UK, EU Countries, Canada, Turkey.**

108. **Propulsion and maneuvering**. The propulsion system should consist of the following:

a. **Diesel Engines**. Two in number four stroke marine diesel engines (driving two shafts and propellers) capable of developing sufficient power required to attain the maximum ship's speed mentioned in this specification.

b. **Reduction Gearbox**. Two in number gearboxes compatible with Diesel Engines. Details to be mentioned.

c. **Number of Shafts**. Two shafts according to the number of main engines propulsion system with reduction gear box (To be mentioned).

d. **Steering System**. Steering system including emergency provision are to be supplied.

e. Associated auxiliary machinery are to be supplied.

f. **Maneuverability**. The hull, propulsion and steering system of the RPV will be such that it can have very good maneuverability:

(1) Stopping length from full ahead to stop : To be mentioned
(2) Turning Circle : To be mentioned.
(3) Tactical diameter : To be mentioned.
(4) Vital machineries and equipment are to be capable of operating satisfactorily at rough sea condition including following:

(a) Permanent trim : Up to 5^0.
(b) Permanent list : Up to 15^0.
(c) Pitching : Up to 10^0
(d) Rolling : Up to 40^0

109. **Power**.

a. 2x Main Diesel Generator (DG) and 1x Emergency Diesel Generator.

b. **DC power**. Automatic DC power back up (for engine control system, navigational equipment and communication system/ equipment at sea for at least 1 hour).

c. Facility for shore supply connection.

d. Solid state conversion equipment.

110. **Seaworthiness**.

a. **Damaged Stability**. The RPV should be able to remain stable even if any two adjacent main transverse watertight sub-divisions are flooded. The Ship's Buoyancy and Damage stability has to be approved by classification society.

b. **Sea Keeping**. The stability of the RPV shall comply with the requirement of international stability criterion of IMO/ SOLAS regulation and class rule. Preliminary capacity plan and stability curves under different loading conditions are to be submitted with the quotation. The RPVs should be able to operate at sea state 3, for operating guns and capable to withstand at sea state 4 running all machinery satisfactorily. However, the RPV shall be capable to sustain at Sea state 5. Minimum amount in percentage (%) of fuel and fresh water shall be mentioned for maintaining stability of vessel at sea state 3, 4 and 5. The stability of the RPVs shall comply with the requirement of internationally accepted stability rules of Classification Society.

111. **Complement**. The total crew complement of the ship will be 25 including 4 officers. Therefore, the ship shall have accommodation for full crew complement.

112. **Construction**. The proposed RPV shall be constructed as follows:

a. Hull structure shall be class approved Steel of Marine Grade AH 32 or AH-36 for hull construction.

b. Superstructure shall be of shipbuilding quality class approved marine grade aluminum Alloy plate of 5083 and 6082 (for hull extrusion) or equivalent/higher.

c. A classification society from LR/DNV/GL/BV shall be appointed for Approval of relevant drawings, construction supervision/inspection and certification.

113. **Design**. The offered RPVs design should comply following criteria:

a. The ship shall be designed based on proven hull design.
b. Proven design shall mean at least 3x proven design ship already built and satisfactorily operated by any other/different navy or coast guard or government maritime security agencies.
c. All machineries and equipment with accessories shall be of most current design.
d. All machineries and equipment shall be designed, manufactured and installed in accordance with the requirement of International Association of Classification society (IACS) member rules.

114. **Place of Construction**. Reputed Public Owned shipyard in Bangladesh.

115. **Delivery**. 5x RPVs will be delivered within **24 months** from the date of signing contract by **30 June 2027**. A detail work schedule to be submitted with the offer mentioning design approval, arrival of machinery, launching and test trial etc.

116. **Special Features**. The ship should be capable of the followings:

a. To conduct small scale pollution control operation by portable/fixed pollution control equipment/facility.

b. To conduct anti-terrorist, anti-dacoity, anti-drug trafficking and anti-human trafficking operations.

c. To tow another vessel of similar displacement. Necessary arrangements for stern towing must be there.

117. **Mission Length**. 10 days.

118. **Signature**. All signatures should be minimum. The shafting and propellers are to be designed for low noise. All heavy vibrating machinery including engines should be

mounted on special vibration and noise absorbing mounts. Thermal radiation, noise and vibration signatures of the RPV at all operating range should meet the standard as per Classification Society rule.

119. **Armament**.

a. Necessary ammunitions should be provided by Shipbuilder/Tenderer for test & trial of the guns.

b. 1x30mm gun including additional 500 rds ammunition for each gun (total 2500 rds for 5xRPVs) has to be provided. 30mm gun should have both local and remote firing system.

c. 2x12.7mm gun including additional 500 rds ammunition for both guns (total 2500 rds for 5xRPVs) has to be provide.

d. After nec test and trial, out of two guns 1x12.7mm Gun may be installed onboard and 1x12.7mm gun may remain as depot stock. However, if design permits, both guns may be installed onboard.

120. **Navigation, Direction and RADAR**.

a. **Navigational Equipment including RADAR**. The country of origin of the following equipment/ items shall be UK, EU Countries, USA and Japan:

(1) 1 x Gyro Compass.
(2) 1 x Magnetic Compass.
(3) 2 x Navigation Radar with integrated ECDIS.
(4) 1 x Speed Log.
(5) 1 x Horns / Sirens.
(6) 2 x Echo Sounder with transducer.
(7) 2 x GPS.
(8) 1 x AIS.
(9) 1 x Anemometer.
(10) 1 x Barometer.
(11) 1 x Barograph.
(12) 1 x Hygrometer.

b. **Meteorological Arrangements**. Standard meteorological equipment and warning systems to be provided.

121. **Communication**.

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

(1) 2 x Tx/Rx HF (Military Frequency) - 100-150W
(2) 1 x Tx/Rx VHF/ UHF - (Narrow Band)
(3) 1 x Tx/Rx VHF/ UHF - (Wide Band)
(4) 1 x Tx/Rx VHF - Air Band
(5) 6 x Tx/Rx VHF (Walkie Talkie)
(6) 1 x Satellite Telephone **(Handheld)**
(7)1 x VSATNET **(Will be provided and installed by BCG)**
(8) 1 x Long-Range Identification and Tracking (LRIT)
(9) 1 x NAVTEX RECEIVER **(Portable)**

(10) 1 x Marine Loud Hailer System (Range at least 2000m)
(11) CCTV **(Only 01 camera in foxl & 01 camera in Quarter deck with 15 days backup).**
(12) Central TV receiving system.

b. **Visual Signaling**. As per BCG standardized communication equipment for RPV, these are following but not to be limited to:

(1) Visual Signaling Stowage Arrangements (02 X Flag Locker & 01 X VS Store).
(2) 04 X Semaphore Pair.
(3) 06 X Black Ball.
(4) 04 X Black Diamond.
(5) 02 X Complete Sets of Dressing Line.
(6) 02 X Complete Set of Flags, Pennants, Ensigns, National and Distinguishing Flags.
(7) 03 X Signal Projector (20 Inch X 01 and 10 Inch X 02).
(8) 02 X flashing light on mast.

c. **Internal Communication System**.

(1) Intercom
(2) Internal broadcast system.
(3) Internet/LAN facilities.
(4) CCTV (Only 01 camera in foxl & 01 camera in Quarter deck with 15 days backup)
(5) Central TV receiving system etc.

122. **Accommodation.**

a. **Accommodation System**. Standard accommodation in the form of cabin/mess shall be provided for following components:

(1) 01 x single berth cabin each for CO with attached lavatory.

(2) 02 x double berth cabins for officers with common lavatory.

(3) 01 x cabin with adequate cupboard/almirah for 6x senior ratings crew with common lavatory.

(4) At least 3 x cabins with adequate cupboard/almirah for 18 x junior ratings (per cabin 6 persons) crew with common lavatory.

b. **Ventilation and Air Conditioning**.

(1) Central air conditioning system for operational and living spaces to maintain room temperature inside ship from 18^0C to 22^0C.

(2) Forced and natural ventilation for machinery spaces.

(3) Country of origin and manufacturing of air conditioning system shall be from USA, UK, EU Countries and Japan.

c. **Medical**. Followings are to be arranged for medical support:

(1) A sick bay with emergency medical support facilities.

(2) Appropriate stowage facilities for medicine (with freezer essential to keep medicine at low temperature).

(3) First aid facilities.

123. **Logistics Arrangement.**

a. **POL**. Fuel and lubricants stowage facility for stated endurance.

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

(1) Dry provisions for 15 days.

(2) Fresh provisions for 5 days with refrigeration facilities.

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

(4) Naval, Engineering, Electrical and Bon's stores facilities.

c. **Ammunition**.

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

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

d. **Water**.

(1) The fresh water capacity shall be at least 10 tons.

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

e. **Cooking/ dining Facilities**.

(1) Common Galley (Cooking) facility for both officers and sailors.

(2) Standard wardroom pantry for Officers.

(3) Standard dining facility for Officers (wardroom).

(4) Common dining and recreation facility for sailors.

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

124. **Miscellaneous.**

a. **Shock, Vibration and Noise**.

(1) Shock standard should fulfill the cumulative thrust of weapons and weather. The RPVs are to be designed and constructed to limit the vibration to such a level which will neither result in discomfort/ annoyance to the crew nor cause damage to/ malfunctioning of/reduction of performance the machinery, equipment and the structure. Shock and vibration mountings according to Classification society warship building standard to withstand shock are to be provided.

(2) Necessary sound insulation and isolation are to be provided so as to keep the sound levels within the limits, which will not result in discomfort to the crew, speech interference or deafness problem. Noise levels to the following spaces will have to be provided 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 radiated noise to underwater, elastically mounted appliances for propulsion engines, diesel generators and other auxiliary machinery will be incorporated to the design.

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

b. **DCFF/Emergency requirement**.

(1) Standard damage control and Fire Fighting (DCFF) equipment as per Classification Society rules.
(2) Fixed firefighting arrangement for machinery space.
(3) Standard first aid and limited medical support including medicine storage facilities.
(4) Fire main system.
(5) DCFF gear store facilities.
(6) Fifi system.

c. **Life Saving Equipment.**

(1) Standard Life saving equipment/items as per SOLAS or equivalent standard are to be provided.

(2) Standard Global Maritime Distress and Safety system (GMDSS) equipment including Emergency Position Indicating Radio Beacon (EPIRB), Search and Rescue Transponders (SART) etc. are to be provided.

(3) **Emergency Life Saving Apparatus (ELSA)**. Adequate number of ELSA to be provided as per SOLAS requirement.

(4) Country of origin and manufacturing of Life Saving equipment shall be from UK, EU Countries, USA and Japan.

d. **Diving Equipment**. Standard diving equipment including bottles charging facilities with breathing air compressor.

e. **Deck Crane**. Minimum 1 x Deck crane of sufficient capacity for hosting and lowering shipboard boat and stores. Country of origin and manufacturer shall be from UK, EU Countries, USA and Japan

f. **Other Equipment /facilities**.

(1) Standard office equipment (Computer, UPS, Printer, Laptop etc.).

(2) Recreation facilities (Television, Music and sound system with karaoke for Ward room, Sailor's recreation room).

g. **General Fitting**. Standard fittings/equipment for general operations necessary for similar kind of war ships.

h. **Documents**. Appropriate drawings, designs, documents, manuals, certificates etc. are to be provided. The list of certificates will include but not limited to the followings:

(1) The RPV shall be designed based on proven hull design. **Maximum 10% deviation** in dimensional parameters may be allowed with CFD analysis. Detail CFD analysis shall be provided while signing the contract.

(2) Certificate issued by the internationally recognized classification society for the main and auxiliary machinery and equipment.

(3) International Tonnage Certificate.

(4) Builders Certificate.

(5) Certificates for fixed fire-fighting system.

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

(7) Magazine safety certificate.

(8) Any other certificates required for classification of the RPV.

125. **Classification**. The RPV must be built according to an internationally recognized classification society's warship building standard (Lloyds/DNV/GL/BV). The classification society referred here must possess the following criteria:

a. Classification society for the construction of RPV must be a permanent member of IACS.

b. Classification society will be from Lloyds/ DNV/GL/ BV.

c. Class Notation: I ✠ HULL ● MACH.

126. **Standard.** In addition to the class requirement for hull, machinery and equipment, 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 in accordance with the gun manufacturer by Shipbuilder.

SECTION – II of ANNEX B

DESIGN AND DRAWING

201. **Introduction.** The design of the offered RPV will be based on proven one.

202. **Design Philosophy**. The vessel should have the following main features:

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

203. **Design Criteria and Standards.**

a. The RPV shall be designed based on proven hull design. **Maximum 10% deviation** in dimensional parameters may be allowed with CFD analysis. Detail CFD analysis shall be provided while signing the contract.

b. The proven design shall mean at least 3 x Proven design ship already built and satisfactorily operated by any/different navy or coast guard or government maritime security agency.

c. All machinery and equipment shall be designed, manufactured and installed in accordance with the requirement of International Association of Classification Society (IACS) member rules.

d. The RPV shall be designed and constructed as per the latest naval ship design criteria and standards with respect to subdivision, stability, structures, shock, vibration, noise, EMI, fire-fighting and vital systems.

e. Vital systems such as propulsion, electric plants and navigation and communication system are to be according to class rule.

f. **Damaged Stability.** The RPV should be able to remain stable even if any two adjacent main transverse watertight sub-divisions are flooded. The Ship's Buoyancy and Damage stability has to be approved by classification society.

g. **Sea Keeping**. The stability of the RPV shall comply with the requirement of International Stability Criterion of IMO/ SOLAS regulation and Class rule. Preliminary capacity plan and stability curves under different loading conditions are to be submitted with the quotation. The RPVs should be able to operate at sea state 3 for operating guns and capable to withstand at sea state 4 running all machinery satisfactorily. However, the RPV shall be capable to sustain at Sea state 5. Minimum amount in percentage (%) of fuel and fresh water shall be mentioned for maintaining stability of vessel at sea state 3, 4 and 5. The stability of the RPVs shall comply with the requirement of internationally accepted stability rules of Classification Society.

204. **Classification**. All drawings supplied by the bidder should be approved by the designated internationally recognized classification society (DNV/GL/Lloyds/ BV).

205. **Certification**. Relevant certificates issued by classification society are to be provided with the drawing.

206. **List of Drawings**. A complete list of drawings that will be supplied is to be submitted prior delivery of these RPVs to BCG.

207. **Fees for Certification**. All fees regarding certification of the drawings are to be borne by the bidder.

208. **Drawing Package**. Seven copies (one for each RPV, one for BCGHQ, one for BCG Dockyard) of each drawing as well as electronic copy are to be supplied. During hand over the drawings which are to be supplied will include but not limited to are given below:

a. General Arrangement.
b. Lines Plan.
c. Offset Table.
d. Detail specification.
e. Hydrostatic data and Curves.
f. Preliminary trim and Stability Calculation booklet.
g. Capacity Plan.
h. Sounding Table.
j. Tank Calibrations.
k. Assessment of inclining experiment at lightship condition.
l. Final Trim and Stability booklet.
m. Principal structural sections.
n. Aft profile and decks.
p. Fwd profiles and decks.
q. Aft sections and bulkheads.
r. Fwd sections and bulkheads.
s. Shell expansion.
t. Engine girders / foundations.
u. Bulwark construction.
v. Bilge keel.
w. Welding plan / Scheme.
x. Deckhouse and Superstructure construction.
y. Bridge deck and Wheel house construction.
z. Hatch covers and hatch coaming.
aa. Details of rudder construction.
bb. Steering gear arrangement.
cc. Details of propellers and shafting.
dd. Plummer block.
ee. Stern tube details.
ff. Shaft bracket/bearing.
gg. Anchoring and Mooring arrangements.
hh. Towing arrangement.
jj. Mast details.
kk. RIB seating arrangement.
ll. RIB lowering and hoisting arrangement.
mm. Bollard and fairlead details.
nn. Ladders, guardrails and stanchion.
pp. Manholes.
qq. Watertight hatches.
rr. Ventilation arrangement.
ss. Position of sea chest.
tt. Bilge piping diagram.
uu. Firefighting system diagram.
vv. Scuppers and drain arrangement.
ww. Fresh water and sea water system diagram.
xx. Fuel oil filling system diagram.

yy. Engine Cooling sea water and fresh water diagram.
zz. Fuel oil pipe line diagram.
aaa. Lub oil pipe line diagram.
bbb. Main Engine and Generator exhaust piping diagram.
ccc. Lub oil filling pipe diagram.
ddd. Air vent pipe diagram.
eee. Sounding pipe diagram.
fff. Engine room layout.
ggg. Accommodation arrangement.
jjj. Docking plan.
kkk. Draught mark.
lll. Electric lighting circuit diagram.
mmm. Electric feeder circuit diagram.
nnn. Radio equipment diagram.
ppp. Nav aid diagram.
qqq. Nav aid lighting system diagram.
rrr. Main switch board drawing.
sss. Arrangement of electric power equipment.
ttt. Ops room arrangement.
uuu. Radio room arrangement.
vvv. Midship section drawing.
www. Drawing of frames.
xxx. Watertight door arrangement.
yyy. Chain locker and hawse pipe details.
zzz. Electrical load calculation.
aaaa. Deck longitudinal girder drawing.
bbbb. Bottom longitudinal girder drawing.
cccc. Bulkhead construction.

Special Condition. The list of drawings given above will act as a guideline only. All other drawings, circuit diagrams, fault finding diagrams and manuals of all relevant to the RPVs and equipment including Main Engines, Generators, Guns, RADAR, Gyro, Log, Radio sets, and other electrical and electronic equipment are to be supplied complete in all respect by the Shipbuilder/Tenderer.

SECTION – III of ANNEX B

HULL AND STRUCTURE

301. **General.** The following paragraphs describe some of the requirement of the hull and structures. The fact is that anything which is not mentioned herein shall not relieve the bidders from their obligation to supply the RPVs complete in all respect.

302. **Construction.** The hull structure shall be class approved mild steel of marine grade AH-32 or AH-36 for hull and all welded construction. Superstructure shall be of shipbuilding quality class approved marine grade aluminum Alloy plate of EN-AW5083 and EN-AW6082 (for hull extrusion) or equivalent/ higher. The aluminum is to be prevented from fire and electrolytic corrosion. Bi-metallic joints are to be used to connect superstructure with the hull. Stainless steel type 316L or 321 shall be used in appropriate place unless mentioned otherwise. The structural design and details of construction are to be made so as to avoid unacceptable noise and vibration. A classification society from Lloyds/ DNV/GL/ BV shall be appointed for Approval of relevant drawings, construction supervision/inspection and certification.

303. **General Arrangement**. Each RPV is to be arranged to have the following accommodation, living and working spaces, tanks and stores in accordance with Sec-XI of this technical specification.

304. **Hull Structure**. The RPV shall have chinned hull, combined transverse and longitudinal framing systems to enable the RPV to withstand heavy impact forces. The longitudinal structural elements will consist of the plating of bottom, sides and main deck, of central keelson, bottom side girders, side stringers, main-deck girders, bottom longitudinal, bilge, ship's sides, main-deck etc. The transverse main structure will consist of appropriate number of watertight bulkheads and of strong web-frames supporting the longitudinal elements. In designing the framing system, consideration will be given to good drainage of water, ballast and accessibility. Steel works are not to be boxed in pockets collecting water. Maximum frame spacing is to be mentioned.

305. **Hull Materials**. The hull will be made of internationally recognized shipbuilding quality (class approved Mild Steel of Marine Grade AH32 or AH-36) steel. Appropriate welding material and techniques approved by the Classification Society shall be used.

306. **Scantling**.

a. The scantlings of the structural members are to be as per the requirement of the internationally recognized classification society standard.

b. The scantling shall commensurate with proven vessel. However, the minimum scantlings/thickness/spacing of the following places are to be mentioned in the quotation:

(1)	Side plating	: At least 4 mm (To be mentioned)
(2)	Bottom plating	: At least 6 mm (To be mentioned)
(3)	Bottom (Propeller)	: To be mentioned.
(4)	Deck plating	: At least 4 mm to 10mm (To be mentioned)
(5)	Sheer strake	: To be mentioned
(6)	Bulkhead plating	: 4 to 6 mm (To be mentioned)
(7)	Shell plating	: To be mentioned
(8)	Transom plating	: To be mentioned.
(9)	Tank	: To be mentioned
(10)	Side longitudinal	: To be mentioned

(11) Deck longitudinal : To be mentioned
(12) Web frames : To be mentioned
(13) Deck girders : To be mentioned
(14) Keel bar : To be mentioned
(15) Super structure plating: To be mentioned

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

308. **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 internationally recognized classifications society's requirements.

309. **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 internationally recognized Classifications Society's requirements.

310. **Bulkheads.** The bulkheads are to be watertight and all welded to the requirement of internationally recognized classification society.

311. **Bulkhead Stiffeners**. These are to be as per Class requirement of internationally recognized classification society.

312. **Main and Auxiliary Machinery Mounting.** These are to be as per the requirement of the international Classification Society/maker of the concerned machine and equipment.

313. **Engine Room Hatches**. The Engine Room hatches are to be of watertight.

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

315. **Sea Chests/ Sea Inlets**. Required numbers of sea chests (in main and auxiliary machinery spaces) are to be integrated in the hull bottom construction. Separate sea chests/ sea inlets shall be provided for Main Engines, DGs and other systems (one for Main Engines, one for DGs and one or more for AC and other systems). However, arrangement for cross connection should be provided for alternative operation. Each chest is to be provided with a dismountable galvanized grating flush attached with the bottom. Each sea chest is to be provided with vent hole at topside as well as drain hole at the bottom side. However, the number of sea chest shall be commensurate with the class rule.

316. **Hawse Pipe**.

a. The anchor is to be stowed in recessed pockets in the shell.
b. The hawse pipe of adequate diameter and length are to be fitted in such a way that free fall of 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.
c. Washing outfitting is to be provided in the hawse pipe.

317. **Construction of Tanks**. The fuel oil, lub oil, foam, fresh water, dirty lub oil, etc. are to be integral part of the hull as far as possible and are to be constructed and tested in accordance with the regulation of the internationally recognized classification society.

318. **Superstructure**.

a. The superstructure including its closed bridge and bridge wings is to be constructed by marine grade aluminum. The superstructure will be of welded construction with bimetallic joints welded to the deck.

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

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

319. **Foundation for Guns**.

a. All guns' foundations will be made to withstand thrust on the deck for avoiding distortion of the structure and the armament/equipment.

b. Guns foundations and supporting structures are to be stiffened to prevent misalignment which would interfere with operation of the weapon/equipment and is to preclude excessive vibration on the foundation.

c. Machining and alignment of guns foundations are to be carried out in accordance with the requirement of manufacturers.

320. **Magazine**. Magazine room for stowage of ammunitions for guns is to be made. In the design of 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 ammunitions. The arrangement will ensure that the ammunitions will be safe when the ship is inclined to 40^0 either side while rolling. Portable vertical and horizontal battens will be fitted with the devices to secure them in their position. All ammunition in stowage will be safe in normal ship operation condition. Special fire proof shielded cables and explosion proof lights and fittings are to be fitted inside the magazine. It is to have flooding and sprinkler system for firefighting. In the magazine, recommended fire-retardant paint scheme is to be applied. Details of the magazine are given in Section IX Article 912.

321. **Small Arms Stowage**. Small arms locker equipped with suitable stowing facility with accessories and ammunitions are to be made as convenient.

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

323. **Painting**.

a. Epoxy coating of International Paint (IP/SIGMA/JOTUN) should be applied in the hull area. Suitable Epoxy/Conventional paint is to be used in other areas as acceptable to BCG.

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

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

d. Fuel oil tanks are to be painted with appropriate epoxy paint scheme

e. Fresh water tanks are to be painted with appropriate class approved food grade paint scheme.

f. Bilges areas are to be painted with approved paint skim of BCG.

g. Non-skid coating is to be applied at weather decks (walkway).

h. Magazine may be painted internally with non-inflammable paint approved by the internationally recognized classification society.

j. Color of external and internal painting of the ship's hull and structure will be decided by BCG.

324. **Cathodic Protection**. Appropriate Cathodic protection (Preferably Zinc Anode) to protect the underwater hull and fittings is to be provided. The number and types of anodes should be suited for at least 3(three) years operational use in sea water. However, Shipbuilder/Tenderer may offer any other suitable arrangement for cathodic protection and anti-fouling purpose.

325. **Insulation and Deck Coverings**.

a. **General**. Living and control spaces are to be fitted with thermal insulation as appropriate. Exposed side of insulation is to be finished with appropriate insulating material where not covered with joiner lining or ceiling panel. The insulation material is to be appropriate one.

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

c. **Face Plate/Lining**. The bulkheads and ceilings of bridge, ops room, living spaces, messes, offices and lavatories are to be laid with plastic coated marine quality wood/panel boards or appropriate honey comb or other standard material with light decorative color approved by BCG.

d. **Deck Coverings**.

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

(2) In other accommodation spaces, offices, lobby, etc. deck coverings are to consist of suitable underlay covered with resin-based Polyurethane.

326. **Signature**. All signatures should be minimum. Sharp bended (right angled) superstructure/high temperature object on upper deck should be avoided. The shafting and propellers are to be designed for low noise. All heavy vibrating machinery including engines should be mounted on special vibration and noise absorbing mounts. Thermal radiation, noise and vibration signatures of the RPV at all operating range should meet the standard as per Classification Society rule.

327. **Hull Designation and Markings**.

a. **Location and Access Closure Marking**. All compartment, doors, hatches, manholes and scuttles are to be marked/ numbered and color coded in accordance with British Navy's BR 2170 (RN) system as practiced in BCG.

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 and at the stern considering under water projection.

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

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

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

f. **NBCD Marking**. NBCD markings (both watertight and gas tight risks) or compartments, doors, hatches etc. are to be as per British Navy's BR 2170 (RN) system as practiced in BCG.

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

h. **Frame Marking**. Frame markings are to be carried out on upper deck (Port & Stbd) engraved and welded with brass plate.

SECTION–IV of ANNEX B

DECK AUXILIARY AND ACCOMMODATION OUTFIT

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

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

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

404. **Construction Supervision**. A construction supervision technical team from foreign shipyard shall be present at local shipbuilder construction site during whole construction period of RPVs. Besides OEM technicians shall be present during installation, test/trial and commissioning of major machinery.

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

406. **Insulation**. The choice and application method of the insulation materials (fire, sound and thermal, as far as applicable) shall be applied in accordance with the regulation of the Classification Society. Recommended are as follows:

a. **Sound Insulation**. To reduce sound levels, the following measures shall be taken:

(1) Acoustic ceilings are to be provided for wheelhouse, mess room, officer's mess and cabins.
(2) Main Engines are to be resiliently mounted
(3) Floating floor in the accommodation
(4) Sound absorbing material i.w.o. the engine room inlet ducts.
(5) Main and generator engines are to be provided with resiliently mounted and water-Cooled exhausts.
(6) Silencers are to be fitted in generator engine exhaust gas lines
(7) Silencers are to be fitted in main engine exhaust gas lines.

b. **Thermal Insulation**. Thermal insulations are to be fitted over the frames. Vapor barriers are provided where necessary. Insulation is placed at the following locations:

(1) All exposed decks in the wheelhouse
(2) All exposed decks in the accommodation
(3) The sides, front and aft bulkheads below the windows in the Wheelhouse.
(4) The sides, front and aft bulkheads of the deckhouse
(5) The sides in the lower deck accommodation
(6) Thickness Approx. 50 mm. Details to be mentioned.

c. **Fire Insulation.** The fire insulation shall be in accordance with Classification requirement. Details are to be mentioned. Insulation shall have to be placed at the following locations:

(1) Deck between the switchboard room and the accommodation.
(2) Bulkhead between the switch board room and the accommodation
(3) Bulkhead and deck between the galley and the accommodation
(4) Around engine inlet ducts up to the fire flaps.
(5) Around inside staircases
(6) Deck between wheelhouse and galley.

407. **Watertight Doors**. All outside doors are to be fitted with stainless steel hinges and toggles and shall be secured in an open position. All outside accommodation doors shall be locked from the inside with a knob and from the outside with a key. Outside doors are generally positioned in accordance with the General Arrangement Plan. Watertight doors are positioned generally according to the rules of a major Classification Society. Considerable issue are as follows:

a. Watertight steel doors shall be secured with wedge clips and handle for working them on both sides of the bulkhead are to be fitted to all external accesses.

b. The internal watertight hinged door(s) shall be of a steel construction. Each door is provided with a central handle. The doors are to be non-remote controlled, with open/close alarms and provided with a sign "keep closed at sea".

c. The doors are to be provided with seals, gaskets and clamping devices of type approved by the classification society, permanently attached to the bulkhead or to the doors and the doors are to be so arranged that those can be operated from both the sides of the bulkheads.

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

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

f. Padlocks are to be provided where necessary.

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

408. **Miscellaneous Non-Watertight Doors**.

a. Access to all offices and accommodations etc. are to be hinged by nonstructural doors.

b. The doors are generally arranged to open into the spaces they serve. Ventilation louvers are to be fitted in 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 only.

409. **Hatches**.

a. All hatches are to be watertight and weather tight 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 clips, wedges, hinges, guards, chains and all other fittings as required. All hinges are to be made from stainless steel.

c. All outside hatches shall be locked either with a sea water resistant padlock or from the inside. For safety provisions for securing hatch covers with corrosion resistant fittings in open position shall be provided.

d. Hatches to store rooms and other spaces which are not normally occupied are to be fitted with butterfly nuts and hinged clips.

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

f. **Engine Room Escape Hatch**. An engine room escape hatch shall be provided on the aft deck. Each hatch shall be provided with a coaming. Considerable dimension are as follows:

(1) Dimension: Approximately 800mm x 800 mm (To be mentioned)
(2) Coaming height : Approximately 600 mm (To be mentioned)

g. **Inspection Hatches** Inspection hatches are to be provided for tanks, void spaces, bilge spaces where necessary.

h. **Closing Devices Air Ducts**. The air duct and ventilator openings have the following closing devices:
(1) The engine room ducts are provided with fire flaps.
(2) The accommodation air inlet and/or outlet ducts are provided with fire flaps or closing hatches.

410. **Manholes and Covers**.

a. Manholes and covers of steel are to be fitted to give access tanks, watertight compartments and similar inaccessible spaces. They are to have water tight or 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.

411. **Windows**.

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

b. Three sets of clear view screen are to be fitted with the front window of bridge.

c. **Fresh water window washing.** Wheelhouse/ bridge windows with window wiper(s) are provided with a fresh water washing system. The system is fed by a separate tank which offers the possibility of using additives. The tank has to be filled manually.

d. **Window wipers.** Electrical (24V) pantograph window wipers shall be fitted on all front wheelhouse windows. The window wipers shall be controlled in groups. The wipers in each group shall be synchronized.

e. **Solar screens**. Solar screens of the rolling type shall be fitted to all the wheelhouse windows, excluding doors.

f. **Double glazed windows.** The wheelhouse and deckhouse are to be provided with double glazed windows. The thickness indicated below shall be considered but not limited to:

(1)	Wheelhouse front window	: 10 mm (To be mentioned)
(2)	Wheelhouse side window	: 8 mm (To be mentioned)
(3)	wheelhouse aft / door windows	: 8 mm (To be mentioned)
(4)	Below deck compartment scuttles	: 10 mm (To be mentioned)

412. **Side Scuttles and Portholes.**

a. All side scuttles are to have brass frame and steel hinged dead light cover.
b. All operable type portholes are to be made of hard glass in brass frames.
c. Water collector is to be fitted with each porthole.

413. **Plan for Doors, Windows and Openings**. A plan for doors, windows, port lights, deck openings, etc. in details is to be submitted with the quotation.

414. **Ladders.** Stairs, ladders, steps, railing and platforms are to be generally positioned in accordance with the General Arrangement Plan. Throughout the Vessel sufficient grab rails and steps are provided for the safety and convenience of the crew.

a. Suitable inclined ladders and vertical ladders are to be installed as required.

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

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

d. Two sets of portable pilot rope ladders are to be provided and arranged adjacent to RHIB with fittings and securing arrangement of the deck.

415. **Bulwark, Rails and Stanchions.** Bulwark shall be installed around the main deck. The material of Bulwark shall be steel. Steel hand rails, storm rails and stanchions will be provided around the open decks and the superstructure where necessary. At each side an opening/ any suitable arrangement shall be provided to the RHIB. The opening shall be closed with stainless steel wire. Details of height, width and thickness of the bulwark to be mentioned with the quotation.

416. **Floor Plates and Gratings**. In machinery spaces and stores, non-skid aluminum checkered plate of minimum thickness of 4mm floor plates are to be provided. Gratings are to be installed for easy maintenance.

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

418. **Mast**. A fabricated steel/ aluminum mast strong enough to carry fire control search and navigational radar and communication equipment with necessary blocks, yardarm, hooks, fittings etc. Is to be erected at the after side of the bridge top deck. The deck structure is to be sufficiently stiffened to bear the load and vibration.

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

420. **Navigation Light Boxes**. Two steel/ aluminum sidelights" boxes welded on the bridge wing are to be provided for housing port and stbd navigation lights.

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

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

423. **Bollards**.

a. Adequate 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. Bollards are to be strong enough to withstand heavy load of side towing or cyclonic weather. Number and position of bollards and fairleads are to be made according to the requirements of BCG (considering the tidal range and berthing arrangement of BCG berths). S.W.L of bollards of different positions are to be mentioned.

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

424. **Fairlead**. Adequate number suitable fairleads are to be provided. The fore and aft fairleads will be suitable for receiving the mooring lines and the towing ropes.

425. **Cleats and Eyebolts**. Sufficient number of cleats, eyebolts, ring bolts and other fittings of required capacity necessary for attachment, working, belaying and securing of all parts and appliances are to be fitted in appropriate location.

426. **Chocks**. In forward bulwark chock(s) are to be provided and details are to be mentioned.

427. **Towing Bitt**. Suitable towing bitt and bollards are to be fitted on the fore peak and aft deck.

428. **Towing Rope**. Towing rope approximately 153 mm diameter of 220 m in length Polyamide rope should be strong enough to take similar ship with same displacement under tow. However, offered rope's diameter and length to be adhered Seamanship manual and design of the ship. Details of the rope to be mentioned.

429. **Mooring / Berthing Hawsers**.

a. 8 x berthing hawser (size 127mm x 110m); Details of the rope to be provided.

b. 2 x spring hawser; As per relevant size mentioned in Seamanship manual. Details of the rope to be provided.

c. 8 x heaving lines are to be provided; As per Seamanship manual. Details of the rope to be provided.

430. **Reels**. Appropriate numbers of reels for securing berthing hawsers, towing rope, spring hawser, shore supply electric cables etc. are to be provided.

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

432. **Canvas**.

a. Two (2) sets of portable awnings (one for regular use and the other one for ceremony) are to be provided as required for spaces at forward and aft main deck. The same is to be provided on upper deck if design permits.

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

433. **Shore Gangway/Brow**.

a. One (1) aluminum made shore gangway/brow of suitable size fitted with handrail, stanchions, wheels, lighting arrangements etc. is to be provided. The ladder is to have a shore roller with neoprene tire at the shore and hook at the other end. Gangway position in forecastle, mid-ship and quarterdeck (on both sides) to be considered accordingly while designing bulwark.

b. The gangway shall be moved outboard manually. Suitable storage fittings for the gangway are provided. The gangway shall be fitted with wheels, aluminum tubular stanchions and plastic-coated stainless-steel wires. The stanchions shall be removable. Considerable dimensions are as follows:

(1) Length : At least 4000 mm (to be mentioned)
(2) Width : At least 600 mm (to be mentioned)

434. **Pilot Ladder**. A pilot ladder shall be provided and stored on board.

435. **Locks, Keys and Tags**. Grandmaster and Master Key section wise for all doors, hatches, stores, lockers, keyboards etc. are to be provided with locking arrangement (padlocks or rim-locks) along with key rings and identification tags etc. Mortise type cylinder locks are to be fitted to joiner doors.

436. **Key Boards**. One in number “Armament Keyboard‟ and one in number” Important Keyboard‟ is to be fitted in 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. Similar smaller key board will be provided in various work spaces as required.

437. **Ship's Boat and Safety Appliances**. Followings are to be supplied.

a. **Rigid Hull Inflatable Boat (RHIB)/ Rigid Inflatable Boat (RIB)**. 1 x Rigid Hull Inflatable Boat (RHIB) as ship's boat for minimum 6 persons with Diesel propulsion system to attain speed not less than 25 knots (with full complement of crew) is to be provided on the main deck or at stern. The boat with appropriate deck crane for hoisting/ lowering arrangement or stern launching/ recovery arrangement/equipment is to be supplied. Details about the boat are to be mentioned. BCG Standardization for ship's boat need to be followed as per following criteria:

(1) Length : preferably 4.9m -5.1m
(2) Breadth : preferably 2.2m – 2.5m
(3) Quantity of Engine/s : To be mentioned
(4) Engine Power (Per Engine) (HP) : 50-60 HP(To be mentioned)
(5) Engine Brand : To be mentioned
(6) Engine type : Out board (To be mentioned)
(7) Country of origin : USA/UK/EU country/Japan
(8) Propulsion system : Jet/ FPP (to be mentioned)
(9) Country of origin of propulsion system: UK, EU countries, USA and Japan.

b. **JEMINI/ Inflatable Boat (IB)**. 1 x JEMINI/ Inflatable Boat (IB) as ship's boat for minimum 6 persons with outboard engine to attain speed not less than 25 knots (with full complement of crew) is to be provided with suitable stowage facilities on main deck. Appropriate deck crane/davit for hoisting/lowering arrangement or stern launching/ recovery arrangement/equipment is to be supplied. Details about the boat are to be mentioned. BCG standardization for ship's boat need to be followed as per following criteria:

(1) Length : preferably 4.0m - 4.2m
(2) Breadth : preferably 1.75m – 2.2m
(3) Quantity of Engine/s : To be mentioned
(4) Engine Power (Per Engine) (HP) : 40-50 HP (To be mentioned)
(5) Engine Brand : Yamaha/Evinrude
(6) Engine type : Out board (To be mentioned)
(7) Country of origin (Engine) : USA /Japan

c. **Life Rafts**. 2 x 25 men capacity inflatable life rafts with cradle and accessories are to be provided.

d. **Life Saving Equipment and First Aid kit**. Sufficient numbers of life buoys (as required), life jacket (as required), hazards duty life jackets (12 in no.), survival-suits (as required), distress Signal and first aid kit (in various position of ship including machineries space, detail location to be mentioned) etc. are to be provided as per GMDSS and Seamanship manual (BR 64) standard following class and SOLAS standard.

e. **Emergency Life Saving Apparatus (ELSA)**. Adequate number of ELSA to be provided as per SOLAS requirement.

e. **Emergency signals.** The following emergency signals are provided:

(1) 12 X Parachute flares Red
(2) 6 X Hand flares Red
(3) 2 X Smoke markers Orange

f. Standard Global Maritime Distress and Safety System (GMDSS) equipment including Emergency Position Indicating Radio Beacon (EPIRB), Search and Rescue Transponders (SART) etc. (Details to be mentioned).

438. **Fire Fighting**.

a. **Fixed Fire Fighting System for Engine rooms.** The engine rooms will be provided with any suitable fixed firefighting/fire suppression system approved by Classification Society which commensurate the volume of engine rooms and can be operated outside the engine rooms from a suitable remote position. Number of bottles and their capacity are to be specified.

b. **Fire Main System**. A pressurized sea water fire main system with sufficient number of fire hydrants is to be laid in the RPV with two dedicated robust fire pumps (to use alternately) attached with hydrants throughout the ship. The fire main pressure, actual number and location of fire hydrants are to be specified.

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

d. **Portable Fire Extinguishers**. Required number of portable fire extinguishers and refills for extinguishing solid, liquid and electric fire are to be provided.

e. **Breathing Apparatus**. 10 x breathing apparatus (BA) with spare bottle and extension harness are to be supplied.

f. **Fearnaught Suit**. 5 x Fearnaught suits for firefighters are to be supplied.

g. **Portable Firefighting Pump**. 2 (Two) in Nos diesel firefighting pump of 30-40 tons/hour capacity with accessories is to be supplied (Brand and type to be mentioned).

h. **Foam Making Branch Pipe and Foam Gun**. 4(four) in Nos portable foam guns, foam making apparatus and foam tanks with accessories are to be supplied.

j. **Flooding and Sprinkler System.** Flooding and Sprinkler system/ Any suitable fire fighting / fire suppression system approved by Classification Society is to be provided for each magazine/ ammunition store.

k. **Fire blanket**. 1(One) in No fire blanket is stored on board.

l. **Fire axe**. 1(One) in No fire axe is stored on board.

m. **Line throwing appliance**. 1(One) in No line throwing appliance is delivered with the Vessel.

n. **Rescue net**. 2(Two) in Nos rescue net to be provided and can be fitted on both sides of the Vessel. The net is stored on board.

439. **Fire and Smoke Detector**. Suitable fire and smoke detection system will be fitted. All working space, accommodations and machinery compartments should have sensors. The monitor of the system will be located at bridge/any suitable place.

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

a. 2 x electrically driven (as per generator's output voltage and frequency) submersible pumps of 5 tons/hour and 3 tons/hour capacity respectively with accessories.
b. 2 sets of damage control equipment, tools and materials.
c. 6 x portable emergency lamps (Re-chargeable).

441. **Diving Equipment Room**. The air-conditioned diving equipment room shall be located in the main hull of the RPV. 8 (Eight) in numbers diving sets with necessary gears and a portable electric air compressor suitable to supply diving air will be arranged in the room. The diving equipment room will have provision for charging the diving sets with safe compressed air supplied from the compressor.

442. **Flag and Navigation Shape Locker**. 2 (Two) in Nos flag lockers with 70 pigeon holes and one in number navigation Shape locker of suitable size are to be fabricated and fitted on the upper deck near to the mast.

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

a. 2 (Two) in Nos aluminum three tier steps is to be provided for using at the end of gangway ladder during high/low water when the ship is alongside jetty.
b. At least 2 (Two) in Nos wooden plungers and one Boson's chair for painting the shipside and the mast.
c. Ropes for halyard, heaving line, boat fall etc. of various sizes and length.
d. 2 (Two) in number boat hooks (with securing arrangement at main deck).
e. Watch and station bill board in the lobby.
f. Deck tackles (with arrangements) for hoisting anchors manually.
g. 1(One) in number bottom chain.
h. Emergency cutting gears (such as axe in forecastle and after deck).
j. 1(One) digital camera with optical zooming facility.
k. 1(One) in number gunmetal ship's bell.
l. 1(One) break water arrangement at Fox'l of the ship.
m. A suitable quantity of Night Vision high-resolution cameras and NVR are to be fitted for covering the whole ship under CCTV surveillance with at least one month of video storage facility.
n. 1(One) in number Stern looking video camera system for the bridge with a display in the bridge.

444. **Deck Machinery.** Deck machinery is to be classed by the internationally recognized classification society with certificates issued.

445. **Steering System.**

a. One electro-hydraulic steering gear system including standard accessories of appropriate capacity and design according to internationally recognized classification society's requirement for double plated twin rudders is to be installed in the steering gear room. Primary steering is to be from bridge with secondary steering position located in the steering gear room. The steering system is to be operated with ship's main power supply. The specification of the steering system is to be stated in details.

b. Easy operating Autopilot systems and mechanisms shall be provided synchronizing with steering system that's why crew can feel comfort to operate this.

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

d. Rudder angle indicators are to be installed in the Bridge, MCR and Steering Gear room.

e. **Emergency Steering Gear**. Necessary arrangements with hand pump are to be fitted for emergency steering in case of system failure. In case of electric power failure, manual steering through operating the hydraulic valves shall be provided. In case of a total hydraulic or electrical failure, the rudders shall be fixed with tackles. Steering shall be done with both engine controls.

446. **Anchor and Chain Cable.** 1 (one) in number stockless anchors of adequate size with necessary chain cables and other accessories including chain compressor and strong back are to be provided. The anchors and cables installation must meet the class requirement. The Vessel shall be provided with two anchor housings. A chain locker(s) is to be fitted in the forepeak, and shall be provided with sufficient drainage. Details about the anchors and chain cables (including length) are to be provided.

447. **Capstan.** 1 (one) in number capstan of adequate capacity is to be installed on the forecastle deck for handling chain cables/mooring ropes. The capstan is to be operated with ship's main power supply. In case of power failure, capstan shall have manual operation facility. Detail of capstan (including power output) is to be provided.

SECTION – V of ANNEX B

ENGINEERING MACHINERY, EQUIPMENT AND SYSTEMS

501. **General**. Propulsion and auxiliary machinery will be supplied by the Shipbuilder/Tenderer as part of package material for the RPV. However, the machinery should meet certain requirements as described below.

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

a. Two in number marine diesel engines capable of developing sufficient total power required to attain the maximum speed of not less than 22 knots, Max continuous speed shall be as per design and Cruising/ Economical speed approximately 15 knots (Number of engines with propellers to be mentioned with the quotation). However, RPV shall be capable to operate in single engine. Max continuous speed shall be mentioned for two engines and single engine operation.

b. Each engine will be connected with Controllable Pitch Propeller (CPP)/ Fixed Pitch Propeller (FPP) to per arrangements of engines reduction gear box. Gearbox/s should preferably have trailing capability for unlimited period. If required extra trailing pump/Cooling arrangement is to be provided.

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

d. Shaft locking gears are to be provided for each shaft. Arrangements should be made such that, if one shaft is not used, it may be locked properly or may be allowed to rotate without any difficulty for single engine operation.

e. In case of total electrical power failure, propulsion system shall have provision to operate independently by any suitable arrangement. Arrangement in this regard is to be mentioned.

503. **Technical Specification of Main Engine**. Stand alone, type approved marine diesel engines with gearbox and stern gear should meet following technical specification:

a.	Model / Type	:	To be mentioned
b.	Make	:	To be mentioned
c.	Country of Origin	:	UK / EU Countries/ USA/ JAPAN
d.	Country of Manufacture	:	UK / EU Countries/ USA/ JAPAN
e.	Year of Manufacture	:	2024 or later.
f.	Cycle	:	4 Stroke.
g.	Aspiration	:	Turbo charged and after Cooled.
h.	Fuel Injection	:	Direct fuel injection.
j.	Cooling	:	Freshwater Cooling. Freshwater being Cooled by seawater through tubular type heat exchanger
k.	Numbers of Cylinder and Arrangement	:	To be mentioned.
l.	Bore and Stroke	:	To be mentioned.

m.	rpm	:	To be mentioned.
n.	Maximum Continuous Rating (MCR)	:	To be specified for each engine, at 45°C air and 32°C seawater temperature. Engine performance curve has to be submitted with the offer.
p.	Maximum Rated Power (if any)	:	To be mentioned.
q.	Brake Mean Effective Pressure (BMEP)		To be mentioned.
r.	Idling rpm	:	To be mentioned.
s.	Time between Top Overhaul	:	To be mentioned.
t.	Time between Major Overhaul		To be mentioned.
u.	Fuel oil to be used	:	Diesel F-76 fuel (To be mentioned).
v.	Lub oil to be used	:	SAE 40 or equivalent must be available in Bangladesh local market (To be mentioned).
w.	Dry-Wet weight (kg)	:	To be mentioned.
x.	Dimension in meter	:	To be mentioned.
y.	Emergency Operation		In case of total electrical power failure, engine shall have provision to operate independently by battery backup or any suitable arrangement. Arrangement in this regard is to be mentioned.

504. **Ambient Condition**.

a. Air intake temperature : + 45^0 C (Max).
b. Sea water temperature : + 32^0 C (Max).
c. Humidity : Up to 98%.
d. Highly mud (suspended) content in sea water in coastal area.

505. **Design and Record of Sales**.

a. The engines should be of new construction, 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.

506. **Maintenance Facility**. Following maintenance facilities are desirable:

a. All engines/accessories should be facilitated for easy removal and reinstallation.

b. The layout of all machinery and system should be such that they provide easy access for routine and onsite maintenance.

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

507. **Automatic Protection Devices**. The machinery should have 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 slow down to safe limit or shutdown is to be arranged for low lubricating oil pressure and high fresh water temperature.

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

d. Manual over speed trip gear/emergency shut off device.

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

a. **Machinery Control**.

(1) Arrangement is to be provided to control the propulsion machinery from **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 Bridge by means of a single lever.

(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 machinery control and alarm system.

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

(5) Control of the generators and Emergency diesel generator are 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. An emergency stop control for each generator set is to be provided in MCR.

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

(8) A machinery control console is to be provided in the MCR, from which selected auxiliary machinery can be operated and monitored.

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

(1) Low lub oil pressure alarm (audio and visual) and auto shut down.
(2) High Cooling water temperature alarm (audio and visual).
(3) High lub 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) Battery backup for at least one hour.

509. **Classification**. Type approval certificate of internationally recognized classification society (Lloyds/DNV/GL/BV) for the engines, gearboxes and auxiliaries are to be provided.

510. **Engine Load Test**.

a. Engine load tests up to maximum permissible limit and time are to be carried out in the factory premises as per requirement of the classification society.
b. All documents related to engine load test are to be provided.

511. **Specific Fuel Consumption (SFC)**. Specific fuel consumption curves of engines are to be provided. Specific fuel consumptions at following ratings are to be specified:

a. Maximum power.
b. Maximum Continuous Rating (MCR).
c. 75% of MCR.
d. 50% of MCR.
e. 25% of MCR.

512. **Fuel System.** Diesel F-76 fuel is to be used (To be mentioned). The proposed fuel system should include the following:

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

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

c. Individual cylinder fuel injection pumps/Unit injector with emergency shutdown device with the engine and at the remote-control panel.

d. Engine governor.

e. Fuel flow meter.

f. Fuel oil pressure and temperature gauge.

g. Fuel drain tank.

513. **Lubricating Oil System.** Proposed propulsion engines and gearboxes are to use same type of lubricating oil (SAE 40/equivalent). The lub oil system for diesel engines and reduction gears are to be arranged in accordance with the requirement of manufacturer. Lubrication system should be of dry sump type specified by the bidder. However, the lubricating oil system should include the following:

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

b. Lubricating oil Cooler, with lubricating oil and Coolant inlet and outlet temperature gauges. Type of Cooler is to be specified. Tubular type Cooler will be preferred.

c. Motor driven lubricating oil priming pump and emergency hand priming pump.

d. Lub oil scavenging pump.

e. Lubricating oil duplex filter with changeover valves.

f. One in number lub oil transfer pump in addition to a hand pump of adequate capacity is to be incorporated in the system (Capacity to be mentioned).

g. Crankcase vent (breather).

514. **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 sea water through heat exchangers. Sea water temperature is from 5°C to 32°C. Sea water is muddy, sandy and dirty in the harbour where the ship is usually berthed and also in the area where the ship usually operates. The arrangement to eliminate mentioned problem for smooth machinery operation to be mentioned. The Cooling water system should include the following**:**

a. Self-priming engine driven sea water and fresh water circulation pumps with discharge pressure gauges.
b. Fresh water Cooler with sea water and fresh water inlet and outlet temperature gauges and Coolant thermostat. Type of Cooler is to be specified. Tubular type Cooler will be preferable.
c. Fresh water expansion tank with vent pipe.

515. **Starting System**. Main engines should be started by battery/Compressed Air. At least two in number starting air compressor with appropriate capacity is to be provided or else compressed air for starting engines may be taken from ships compressed air system (In case of compressed air starting system). Otherwise, latest starting motor and maintenance free battery may be used in the Engine Starting System (In case of starting system by battery). Details to be mentioned.

516. **Shutdown System**. Engine shutdown system may include the following:

a. Normal shut down via injection pump both with the engine and at the remote-control panel (To be mentioned).
b. Emergency shutdown via emergency air shut-off flaps, by stopping combustion air supply (To be mentioned).

517. **Combustion Air System**. Following may be included with the combustion air system:
a. Turbocharger.
b. Air after Cooler.
c. Set of air intake adapters and filters.

518. **Exhaust System**. Among other, the system should have the following:
a. Provisions for monitoring exhaust temperature of combined cylinders/individual cylinder and supply of temperature gauge for turbo-charger.
b. Expansion bellows between turbo-charger and main exhaust pipe.
c. Exhaust silencers.
d. Exhaust flaps.

519. **Mountings**. Vibration of engines shall be minimum conforming to class rules. 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.

520. **Torsional Vibration Damper**. The engines are to be fitted with torsional vibration damper.

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

a. Heat resistant torsional resilient coupling approved by the Classification Society (Lloyds/DNV/GL/BV).

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

522. **Gear Box**. Details of gearbox are as follows:

a. Each main engine to drive one propeller shaft via a reduction gearbox of UK/USA/JAPAN/EU Countries origin and manufactured. Gearbox and propeller shafts are to be mounted 'in-line". The gearbox will be flanged to the engine and will take the axial thrust. Details of arrangement to be mentioned.

b. The details of gearbox with reduction ratio are to be specified.

c. The gearboxes are to have a provision for unlimited trailing operation. If required separate trailing pumps are to be added. In case of total electrical power failure, gearboxes shall have provision to operate independently by PTO or any suitable arrangement. Arrangement in this regard is to be mentioned.

d. Clutch Control. Each clutch is to be operated remotely and emergency clutch control mechanism should also be provided on the gear box. In case of total electrical power failure, clutch control shall have provision to operate independently by any suitable arrangement. Arrangement in this regard is to be mentioned.

e. **Mounting of Gearbox**. Mounting for the gearbox housing is to be of rigid mounting type.

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

g. **Oil Pressure Gauges**. The gear box is to be fitted with oil pressure gauges as required for local and monitoring of the clutch oil and lubricating oil system.

h. **Lub Oil Cooler**. Tubular type lub oil Cooler is to be mounted on or near a gearbox. Sea water to gearbox is to be supplied form separate sea water pump with emergency Cooling from fire-main.

j. **Temperature Gauges**. Temperature gauges are to be provided for oil temperatures and sea water inlet outlet temperatures of the Cooler.

k. **Monitoring**. Following monitoring systems are to be provided:

(1) Lub oil pressure -local and remote.
(2) Lub oil temperature-local and remote.
(3) Clutch engage/disengage status - local and remote.
(4) Bearing temperature –local (Preferred, to be mentioned).

523. **Propeller**.

a. Propeller made of Nickel-Aluminum-Bronze alloy or any other suitable material is to be fitted for the nominal marine diesel engine torque. The propellers are to be class approved by the internationally recognized classification society.

b. The detailed technical information including weight, diameter, pitch, BAR, Numbers of blades, material etc. are to be included in the offer. Country of origin and manufacturer will be from USA/ UK/ EU Countries/Japan.

524. **Technical Particulars of Shafting**. Technical particulars of shafting are to be as follows:

a. **Propeller Shaft**. Propeller shafts are to be made as per latest technology and should be made of high-quality stainless steel (Shaft material AISI 431 or W.S. EN 1.4418) in accordance with the requirements of the internationally recognized classification society. The propeller will have sufficient strength to transmit power of the engines during ship's entire life.

b. **Stern Tube and Brackets**. Each stern tube is to be made of a thick-walled steel pipe which should be welded to the hull and would be supported aft by V-configuration 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. 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 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**. Appropriate motor driven turning device with built in reduction gear is to be installed to turn propeller shaft. Manual arrangement for shaft turning should be provided.

g. **Plummer Block and Watertight Bulkhead Gland**. Plumber block and water tight bulkhead gland is to be installed as per the relevant rules of classification.

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

526. **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.

527. **Instruments to be Mounted on Main Engines.** Sensors and displays with alarm system for sea water, fresh water, lub oil systems to be incorporated (Details are to be mentioned).

528. **Remote Control from MCR.** Each local control desk is to be equipped at least with 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 lub oil pressure gauge (independent and direct reading).
g. Engine lub oil temperature gauge (independent and direct reading
h. Gearbox lub oil pressure gauge.
j. Engine exhaust temperature (combined) gauge.
k. Control levers/ switches for ahead/astern/neutral position of both gearboxes.
l. Changeover switches to shift throttle contract from engine local control to MCR vice versa and from MCR to wheel house vice versa.
m. Alarm (Visual and audio) in case of:

(1) Engine over speed.
(2) Low engine lub oil pressure.
(3) Low gearbox lub oil pressure.
(4) High engine Coolant temperature.

529. **Remote Control from Bridge.** Control desk for both engines and gearboxes is to be positioned in the wheel house of the ship. The control desk is to be equipped with the following instruments**:**

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).

530. **Ship's Compressed Air System**. A suitable compressed air system (from air compressor used for starting engines) is to be provided to supply compressed air for ship's services. Necessary reducing valves are to be arranged as necessary.

531. **Generating Plant, Diesel Engines for Generators**. 2 x Main Diesel Generator (DG) (each of same capacity) shall be provided. Each DG should be capable enough to take combat load (combat load should include followings items but not limited to – Armaments, propulsion, steering, RADAR, Echo sounder, galley, AC, Navigational equipment, fire and bilge pump, de-flooding system, boat lowering winch etc. to be calculated and mentioned). 2 x DG should be capable enough to take full load in parallel operations.

532. **Emergency Diesel Generator**. One in number Emergency Diesel generator capable to take minimum cruising load.

533. **Bow Thruster (Optional)**. Price to be quoted separately with the tender.

534. **Fresh Water System**.

a. **Fresh Water Hydrophore System**. Freshwater will be supplied through a hydrophore system consisting of two pumps with one hydrophore tank. It should be arranged to provide a continuous supply from storage tanks to general water supply system and machinery feed water system throughout the ship. One pump and hydrophore tank should serve as main and another pump will remain as standby. Fresh water supply is to be given to galley, sanitary spaces, dining space and engine room. Water purifier (with RO-UV facility) to supply drinkable water from the fresh water tank shall be fitted at different position of the ship (accommodations, messing area, galley, pantry, ECR, ward room, etc. where deemed necessary).

b. **Fresh Water filling system**. Suitable arrangement to be there in fwd and aft section of the ship (both in port and stbd side) to take fresh water on board while at harbor to fill ship's Fresh water tank. Details to be mentioned.

535. **Firemain 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 x fire and bilge pumps fitted in machinery space. The fire and bilge pumps are to draw suction from sea chest via strainer and discharge to the fire main with an isolating valve.

b. The fire main system should always maintain at least 7 bar pressure to provide seawater for the following systems/points:

(1) Fire hydrants.
(2) Sprinkler and flooding system for ammunition store/magazine.
(3) Emergency Cooling system of required machinery.

536. **Sea Chests/Sea Inlets**. Required numbers of sea chests (in main and auxiliary machinery spaces) are to be integrated in the hull bottom construction. Separate sea chests/ sea inlets shall be provided for Main Engines, DGs and other systems (one for Main Engines, one for DGs and one or more for AC and other systems). However, arrangement for cross connection should be provided for alternative operation. Each chest is to be provided with a dismountable galvanized grating flush attached with the bottom. Each sea chest is to be provided with vent hole at topside as well as drain hole at the bottom side. However, the number of sea chest shall be commensurate with the class rule.

537. **Fuel Oil Tank and System**. The fuel tank capacity should be such that the desired at least endurance of approximately 1500 nautical miles at economical speed can be achieved at the consumption of total fuel oil capacity. The fuel oil tanks will be connected via pipes and valves. The system is to consist of the following:

a. Required number of fuel transfer pump to transfer fuel oil between the tanks with alternative manual transfer facility. (Details to be mentioned during submission of quotation).

b. Required number of strainers of simplex type at suction side of each pump. (Details to be mentioned during submission of quotation).

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

d. 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 : To be mentioned
(2) Type : Gear
(3) Capacity : 20 m^3/h
(4) Pressure head: 3 bar or more
(5) Drive : Electric motor

538. **Lubricating Oil Tank and System**. Propulsion engines, diesel generator engines, Emergency Diesel generator and gearboxes are to use same type of lubricating oil (SAE 40 or equivalent, which must be available in 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 engine sump will be discharged via a hand pump to a dirty lub oil tank. The lub oil system for diesel engines, generators, Emergency diesel generator and reduction gears will be arranged in accordance with the requirement of manufacturer. One in number lub oil transfer pump of adequate capacity is to be incorporated in the system.

539. **Air Conditioning and Ventilation**. The Air Conditioning system should be of "All air system/Chilled water system/Central single duct type" i.e. Cooled air will be circulated through AHU/chilled water/Air Duct should be circulated through fan coil unit by ducting and louver. Arrangement of ventilation and air conditioning system will be as follows:

a. **Air Conditioning System**. The vessel shall be provided with central single duct type air conditioning system covering all living rooms, dining room, office room, wheelhouse etc. The system shall consist of one set of air handling unit having 100% of total required air load capacity. Two complete automatic sets of compressors/ condensing units shall be provided (one working and one standby). The AC system should be designed to perform following conditions:

(1) **Environmental Conditions.**
(a) Dry bulb temperature : 35-42^0 C.
(b) Relative Humidity : Up to 98%.

(2) **Desired Conditions (with single AC plant).**
(a) Dry bulb temperature : 18^{0}C to 22^0 C.
(b) Relative Humidity : 50%.

(3) Country of origin and manufacturer: UK, EU countries, USA, Japan

(4) **Details**. Details (Maker/ brand, manufacturing country, type, model, of AC plant, compressors and condensers, number of air handling unit, overall dimension, weight etc.) of central air conditioning system are to be mentioned.

b. **Ventilation of Engine Room**. Appropriate arrangement is to be there for engine room ventilation (considering ambient condition). Requirement of supply blowers needs to be ascertained by the bidder as per the aspiration need of proposed engines and to be provided. Exhaust blowers of adequate capacity are also to be fitted in convenient place in each engine room. Number of supply and exhaust blower with size and capacity 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 which are

not air conditioned). Number of supply and exhaust blower with size and capacity are to be specified.

540. **Domestic and Deep Fridge**.

a. The Domestic and Deep Fridge should have sufficient capacity to refrigerate fresh provision of at least 5 days. The fridge is to be compatible with ship's electrical supply. In addition, the refrigerators should be operable to run with shore supply voltage.

b. Detailed specification and total quantity of the refrigerators is to be submitted within the quotation.

c. Country of origin and manufacturer UK, EU countries, USA, Japan.

541. **Piping**. Piping of various systems should meet class requirements fulfilling followings:

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 dimension 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 expansion/contraction of the piping 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 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 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 absolutely necessary, flanges or screwed joints are not to be located over electrical equipment.

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

j. Where piping or its components penetrate 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 pipe line, they are to be strong enough to hold the pressure and perform purpose intended.

l. Pipes are to be marked with color 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 clearly indicate the function of the valve. Engraved letters shall be filled with black or red enamel paint.

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

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

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

(1) Freshwater Cooling System: Seamless galvanized steel pipes (STPG370 or equivalent)
(2) Domestic Freshwater System (Drinking and Hot Water): Seamless Copper Pipes
(3) Seawater Cooling System: Seamless 90/10 Cu-Ni pipes
(4) Fire Main System: Seamless 90/10 Cu-Ni pipes
(5) Domestic Seawater System: Seamless 90/10 Cu-Ni pipes
(6) Bilge System: Seamless 90/10 Cu-Ni pipes
(7) Ballast System: Seamless 90/10 Cu-Ni pipes
(8) Sprinkler System: Seamless 90/10 Cu-Ni pipes
(9) Scuppers and Drains: Galvanized steel pipes (STPG370 or equivalent)
(10) Fuel Oil System: Seamless steel pipes (STPG370 or equivalent)
(11) Lube Oil System: Seamless steel pipes (STPG370 or equivalent)
(12) Hydraulic System: Seamless steel pipes (STPG370 or equivalent)
(13) Compressed Air system: Seamless steel pipes (STPG370 or equivalent)
(14) Exhaust Gas System: Seamless steel pipes (SUS316L or equivalent)
(15) Air Vent System: Galvanized steel pipes (STPG370 or equivalent)

542. **Heat Exchangers**. Heat exchangers should meet following requirements:

a. **Engine Fresh Water Cooler**. Heat exchangers of adequate capacity suitable for tropical environment are to be installed with each main engine, diesel generators and Emergency diesel generator. The heat exchangers should have sea water supply from the sea chests. Provisions of opening the chests for inspection are to be made. Detailed information about the type of Cooler is to be provided.

b. **Lubricating Oil Coolers**. Lubricating oil Coolers of adequate capacity are to be incorporated in each engine layout and gearboxes.

543. **Air and Exhaust Arrangement**.

a. The turbo-chargers are to obtain air suction via air filters from the well-ventilated engine room.

b. Exhaust gases from main engines, diesel generators and Emergency diesel generator are to be led to the atmosphere via a dry type exhaust silencer to ships side/through funnel at upper deck.

c. Expansion pieces are to be arranged for exhaust systems where necessary. The exhaust system is to be insulated with appropriate thickness of mineral wool with galvanized steel with suitable portable arrangement in way 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, diesel generator and Emergency diesel generator will be fitted with separate exhaust flap.

h. Engine room temperature shall not exceed 10 degrees centigrade more than the ambient temp. Adequate ventilation to be provided considering Bangladesh high ambient temp and humid weather.

544. **Filling, Sounding and De-aeration System**. The fuel and lub 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 fresh water sounding pipes are to be located in the accommodation compartments.

545. **Pollution Control System.** A set of portable Pollution control equipment with necessary accessories and arrangement considering sea condition of Bangladesh coastal area is to be provided (Floating boom, skimmer, skimmer suction pump etc.) to fight pollution (like oil spillage etc.). Detail to be mentioned.

546. **Protection against Marine Pollution.** The RPVs will have IMO, MARPOL approved means for disposal of garbage, oily water and other wastes complying class approval.

547. **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 BCG:

a. Fuel oil for all machinery, engines, generators and Emergency diesel generator.
b. Lub oil for Main engines, Diesel generators, Emergency diesel generator and Gearboxes.
c. Lub oil and refrigerant for air conditioning plants.
d. Special purpose greases.
e. Cooling water inhibitor for main engines, diesel generators and Emergency diesel generator.
f. Lub oil test kit and chemicals.
g. Oil dispersant to test Pollution control system (oil spillage).
h. Refrigerant gas for Air conditioning plant.
i. Oil for steering system.
j. Oil for hydraulic system.

SECTION – VI of ANNEX B

ELECTRICAL MACHINERY, EQUIPMENT AND SYSTEMS

601. **General**.

a. All electrical systems, equipment, machinery, fittings, fixtures, items, cables, wiring etc. shall comply with recognized marine standards.

b. Electrical equipment shall be tropicalized and shall have Class F insulation unless otherwise stated. The maximum allowable temperature rise on all electrical equipment and wiring are to be based on an ambient temperature of 45°C and humidity of about 95% RH.

c. Machinery temporarily or permanently exposed to the outside atmosphere or water shall have Ingress Protection Rating IP56.

d. Electrical equipment shall be designed and located for easy access for repairs and removals. Equipment shall be located so as to minimize damage.

e. The casings of all electrical machine/equipment are to be properly earthed (grounded) and earthing points are also to be provided for portable electrical equipment as per requirement. All electrical equipment is to be interference free as per the manufacturer's requirement.

f. All wiring, cables, breakers, distribution panels, machines etc. are to be clearly labeled and systematically coded for ease of identification. Recognized warship standard of "Procedure of Identification of Electrical Circuit in Warship" is to be followed.

g. Necessary documents, drawing, circuit diagram 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 3 phases of cables, busbars, terminals etc. of AC circuit.

j. Red and Black colors are to be used to identify positive and negative polarity of cables, busbars, terminals etc. of DC circuit.

k. All electrical motors with a load capacity more than 3kw should be provided with Star-Delta starter.

l. Country of Origin and Manufacture: USA, UK, EU Countries and Japan.

602. **Ship's Main Power System.** The main power supply system will be designed and developed as a complete solution for the ship to run at full efficiency both at sea on its own power (without conversion) and at harbour on national power supply system 400V, 50Hz, 3 Phase. Accordingly, all electrical machinery necessary to use at harbour should be so designed. In case of precision equipment's sensitive to voltage and frequency change required for harbour use, two sets of converters, one for running at required harbour load (as per load calculation to be submitted by the bidder) and another standby of same capacity, along with other necessary gears will be installed on board. Necessary load calculation and load management information for sea and harbour are to be submitted with the quotation.

603. **Schematic Diagram**. Schematic diagrams of electrical distribution system of the ship are desirable with the offer. Detail diagram of the electrical distribution system is to be provided during delivery of ship.

604. **Electrical Load Analysis**. Electrical load analysis is desirable with the quotation showing following:

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

605. **Provision of Power for Future Equipment**. At least 20% of full load capacity of reserve power is to be kept for future machinery/ equipment.

606. **Alternative Power**. All essential services including weapons and sensors should have alternative power arrangement.

607. **Emergency Power**. Temporary arrangements are to be kept for emergency power distribution. Country of origine and manufacturer of emergency switchboard will be USA/UK/EU Countries/Japan.

608. **EMI Compatibility**. Equipment design and setup should have EMC to suppress EMI.

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

a. 2 (Two) in Nos Main Diesel Generators (DG) with Automatic Transfer Switch (ATS) in each DG.
b. 1 (One) in No Emergency Diesel Generator capable of taking minimum cruising load.
c. 1 (One) in No Main Switchboard.
d. Distribution Panel/ Switches with required safety features as required.
e. Required number of motors, pumps and auxiliary machinery as required following international standard for a warship.

610. **Conversion Machinery**.

a. The number of Transformers (for generating voltage 220V and 115V) as required of appropriate capacity (are to be mentioned with capacity during the offer).
b. Rectifiers 110V DC and 24V DC as required for Guns, Navigational lights etc. of appropriate capacity.
c. Static frequency converter for control system is to be provided. An alternative arrangement is to be there in case of failure of frequency converter. Required number of frequency converter along with paralleling of those is to be mentioned.

611. **Shore Supply Arrangement.** A cable and connection for shore power supply (Ship along sides supply arrangement) with breaker is to be provided. The cable shall be fitted with a male plug on the shore side and female plug on the vessel side. The shore power supply connection is intended to provide power to the ship, up to the current given below.

a. Current : 180 Amps
b. Voltage : 400 V
c. Frequency : 50 Hz
d. Length of cable : 180 m

612. **DC Power Backup.** Automatic DC power backup (for engine control system, navigational equipment and communication system/ equipment at sea for at least 1 hour.

a. 1 (One) in No Battery Switch board.

b. **Batteries.**

(1) General use batteries as required are to be provided (number is to be mentioned.

(2) Battery required for Communication System including emergency as required (number is to be mentioned).

(3) Emergency battery supply for engine control and monitoring, navigational equipment/lights etc. for safety at sea.

(4) Battery capacity is to be calculated so that general use battery needs to operate for the services of at least 1 hour continuously. Communication system battery also needs to be designed for 1 hour's operation.

(5) Automatic Battery Chargers including portable battery chargers are to be provided (number is to be mentioned).

613. **Main Generator Sets**. An electrical power generation system consisting of two identical marine type 400V, 3 Phase, 50Hz, 3 wire generators is to be installed. Two DG should be capable to take the full load (combat) with 20% surplus power. Each generator should be capable of taking maximum combat load of the vessel. Both generators should be suitable to run simultaneously in parallel condition in addition to auto load sharing arrangement in case of increase/decrease load to a specified maximum/minimum level. The generators should have all standard safety devices including emergency shutdown devices. The requirement of the main generators is outlined below:

a. **Specifications of Main Generating Set**. Type approved each generator set shall be type approved and of following specification:

(1) Maker : To be mentioned

(2) Type : Marine type

(3) Year of Manufacture: 2024 or later

(4) Output: Maximum combat load by one DG (To be mentioned).

(5) Type of Operations: Continuous duty (could be for days at a required stretch).

(6) Overload rating: To be mentioned

(7) Minimum allowable: To be mentioned (25% of Maximum continuous load (low continuous rating or less preferable)

(8) RPM: To be mentioned (preferably not more than 1500 rpm)

(9) Overall weight and Dimension: To be mentioned (Less weight and compact design is preferable).

b. **Loading Condition**. The generators will be subjected to sudden high inductive load, like 3 phase induction motors, where starting transient current will be

very high (about 05 times of 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 following conditions:

(1) **Transient Voltage Variation**. The transient voltage variation of the generating sets will be as follows:

Ser	Description	Variation/ Recovery Time
1	Transient voltage variation, when at any load up to 50% of the rated load at 0.8 lagging power factor, a load equal to 50% rated load at any power factor between zero and 0.4 lagging is suddenly applied/removed.	To be mentioned.
2	Transient voltage variation, when at any load between 25% and 75% of rated load at 0.8 lagging power factor, a load equal to 25% rated load at 0.8 lagging power factor is suddenly applied/removed.	Should be within±4.5%.
3	Transient voltage variation, when 100% of the rated load is suddenly applied/removed.	To be mentioned.
4	**Voltage Recovery Time.** In all the cases mentioned above, the voltage is to be restored to 99% of the rated voltage within 2 seconds of the instant of load change.	

(2) **Transient Frequency Variation**. The transient frequency variation of the generating sets will be as follows:

Ser	Description	Variation/ Recovery Time
1	Transient frequency variation for 25% load changes from 0% to 100% (in steps) and also in reverse load changes	±1.5% Recovery time to be mentioned.
2	Steady state frequency variation from no load to full load (governor droop)	Up to 1% Recovery time to be mentioned.
3	Time of recovery to reach within 0.2% i.e. 99.8% of the rated frequency.	Not more than 2 Sec. Recovery time to be mentioned.
4	Graphs showing various characteristics and response of transient voltage and frequency variation	To be submitted with the FAT

c. **Coupling**. The double bearing alternators are to be flanged to the prime mover (engine) via flexible coupling.

d. **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 mounting. Lifting eyes are to be provided for lifting the complete generating set as a whole and also the engine and the alternator separately.

e. **Mounting**. The generators are to be installed with standard shock and anti-vibration mountings along with holding-down bolts.

f. **Specification of Marine Alternators**. Each of the alternators is to be of 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**. To be supplied as per classification society requirement (LR/BV/DNV/GL):

(a) Maker : To be mentioned

(b) Country of origin and manufacture : UK, EU Countries, USA, Japan

(c) Model/type : To be mentioned

(d) Number of poles : Four or more

(e) Maximum : Sufficient to cater for combat load plus continuous rating 20% reserve. When two DG will be running in parallel

(f) Power factor : 0.8 lagging

(g) Rated Terminal : To be mentioned

(h) Frequency : To be mentioned

(j) No of phases : 3 (three)

(k) Speed : To be mentioned (Preferably not more than 1500 rpm)

(l) Rotor : Dynamically balanced after winding as per BS 49999/50 and with surge voltage suppression device wound on field poles

(m) Stator : Durable winding in star configuration with high grade electrical steel or equivalent

(n) Connection : 3 wire, star connection, neutral ungrounded

(p) Excitation : Shunt with Permanent Magnet Generator (PMG) excitation system/Auxiliary Regulation Excitation system (ARE)

(q) Ventilation : Self-ventilated, air Cooled, air temperature up to 45°C

(r) Insulation : F/H

(s) Temperature rise : To be mentioned

(t) Enclosure : IP 23 or better

(u) Nos of Bearings: 2 x bearings, re-greaseable

(v) 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

(w) Stator temperature : Shall have embedded temperature detectors sensors in each phase for protection. Temperature readings to be shown on main switchboard

(x) Parallel operation : Both auto and manual parallel operation systems are to be incorporated. A drop kit (as applicable) for continuous parallel running with all 2(two) generators is to be provided.

g. **Auto Voltage Regulator (AVR)**. The AVR is to be of electronic type with three phase sensing devices. Detail description of AVR shall be provided with the quotation. At least following should be included in the AVR:

(1) Maker : To be mentioned
(2) Model/Type of AVR : To be mentioned
(3) Voltage adjustment range : Should be ±10 % of rated value
(4) Sensing input voltage : 3 Phase sensing
(5) Steady-state stability : Should be within 0.5% of rms rated value
(6) Remote hand voltage : Voltage trimmer at trimmer switchboard to adjust voltage by hand trimmer
(7) Over excitation protection : To be incorporated
(8) Thermal trip protection and indication: To be incorporated
(9) Short circuit protection : As per naval vessel characteristics requirement
(10) Over and under voltage protection: To be incorporated
(11) Over and under frequency protection: To be incorporated.

h. **Alternator Warning and Shutdown Indications**. To ensure safety following warning and shutdown devices are desirable in each of the alternator panel of Main Switchboard:

(1) Overload Indication
(2) Short circuit condition
(3) Synchronization failure
(4) Over / under voltage indication
(5) Reverse power indication
(6) Under frequency indication
(7) Excitation loss

j. **Control Panel**. The following components are to be included with the generator mounted control panel:

(1) Panel lights with ON / OFF switch
(2) Over speed protection device
(3) Visual / audible alarm device
(4) Panel lights with ON / OFF switch

k. **Generator Control Panel**. All necessary gauges / meters including kilowatt meters are to be fitted in the control panel.

l. **Specification of Prime Mover (Diesel Engine) for Generators**. Marine type with alternate Cooling system arrangement.

(1) Maker : To be mentioned
(2) Country of Origin and Manufacturer: UK, USA, EU Countries and Japan.
(3) Model : To be mentioned
(4) Number of strokes : 4
(5) Number of cylinders : To be mentioned
(6) Bore and Stroke : To be mentioned
(7) Compression ratio : To be mentioned
(8) Aspiration : Turbocharged and after Cooled
(9) Combustion : Direct fuel injection
(10) RPM (Preferably not more than 1500 rpm): To be mentioned
(11) Brake Mean Effective Pressure (BMEP) : To be specified and mentioned
(12) Power: To be mentioned. It should match the requirement of alternator as per marine standard to provide required power at continuous rating and also at overload rating at 45^0C air and 32^0C sea water temperature.
(13) Specific fuel consumption : To be mentioned. at rated Maximum Continuous Rating.
(14) Specific lub oil consumption at rated power: To be mentioned.
(15) Combustion air requirement: To be mentioned.

m. **Governor**. Load sharing and speed control precision electronic governor of approved type is to be provided. The governor should maintain the rpm in steady state and should response instantaneously to any amount of inductive/resistive load change (from 0 to 100% of rated load).

n. **Turbocharger**. Make, model may be specified.

p. **Fuel Oil to be used**. HSD or NATO F-76/Dieso F-76 fuel (To be mentioned).

q. **Lub Oil to be used**. Grade SAE 40 or equivalent to be used, which must be available in Bangladesh local market (To be mentioned).

r. **Starting System**. Generator is to be started by batteries. A necessary arrangement is to be made in this regard.

s. **Time between Overhauls**.

(1) **Major Overhaul**. To be mentioned.
(2) **Top Overhaul**. To be mentioned.

t. **Accessories**. Standard accessories as required by are to be fitted.

u. **Engine Control and Monitoring Panel**. The following meters and gauges are desirable in the engine mounted engine control and monitoring panel:

(1) **Meters**.

(a) RPM tachometer.
(b) Hour counter.

(2) **Gauges**.

(a) Lub oil pressure gauge.
(b) Sea water pressure gauge.
(c) Fresh water pressure gauge.
(d) Lub oil filter differential pressure gauge
(e) Lub oil temp gauge.
(f) Fresh water temperature gauge.
(g) Fuel oil pressure gauge.

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v. **Safety Devices**. Following safety devices are to be provided in each generator set:

(1) Low lub oil pressure alarm (audio and visual) and auto shut down
(2) High Cooling water temperature alarm (audio and visual)
(3) High lub 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.

w. **Dimension and Weight**. The dimensions and weight of the prime mover are to be mentioned.

614. **Emergency Generator Set**. A type approved electrical power generation system consisting of one identical marine type 400V, 3 Phase, 50Hz, 3 wire generators is to be installed. The generator should have all standard safety devices including emergency shutdown devices. The requirement of the emergency generator is outlined below:

a. **Specifications of Emergency Generator Set**. Type approved diesel generator set shall be of following specification:

(1) Maker : To be mentioned.
(2) Type : Marine type
(3) Year of Manufacture: 2024 or later.
(4) Output : At least cruising load (propulsion, navigation, gyro, firefighting, galley, lighting, ventilation, air conditioning, boat lowering, etc.) with 20% extra reserve load
(5) Type of Operations : Continuous duty (could be for days at a required stretch).
(6) Overload rating : To be specified.
(7) Minimum allowable: To be specified (25% of Maximum continuous load (low Continuous Rating or less preferable).
(8) RPM : To be mentioned (preferably not more than 1500 rpm).
(9) Overall weight and Dimension: To be mentioned. Less weight and compact design is preferable.

b. **Loading Condition**. The generators will be subjected to sudden high inductive load, like 3 phase induction motors, where starting transient current will be very high (about 05 times of 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 following conditions:

(1) **Transient Voltage Variation**. The transient voltage variation of the generating sets will be as follows:

Ser	Description	Variation/ Recovery Time
1	Transient voltage variation, when at any load up to 50% of the rated load at 0.8 lagging power factor, a load equal to 50% rated load at any power factor between zero and 0.4 lagging is suddenly applied/removed.	To be mentioned.
2	Transient voltage variation, when at any load between 25% and 75% of rated load at 0.8 lagging power factor, a load equal to 25% rated load at 0.8 lagging power factor is suddenly applied/removed.	Should be within±4.5%.
3	Transient voltage variation, when 100% of the rated load is suddenly applied/removed.	To be mentioned.
4	**Voltage Recovery Time.** In all the cases mentioned above, the voltage is to be restored to 99% of the rated voltage within 2 seconds of the instant of load change.	

(2) **Transient Frequency Variation**. The transient frequency variation of the generating sets will be as follows:

Ser	Description	Variation/ Recovery Time
1	Transient frequency variation for 25% load changes from 0% to 100% (in steps) and also in reverse load changes	±1.5% Recovery time to be mentioned.
2	Steady state frequency variation from no load to full load (governor droop)	Up to 1% Recovery time to be mentioned.
3	Time of recovery to reach within 0.2% i.e. 99.8% of the rated frequency.	Not more than 2 Sec. Recovery time to be mentioned.
4	Graphs showing various characteristics and response of transient voltage and frequency variation	To be submitted with the FAT

c. **Coupling**. The double bearing alternators are to be flanged to the prime mover (engine) via flexible coupling.

d. **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 mounting. Lifting eyes are to be provided for lifting the complete generating set as a whole and also the engine and the alternator separately.

e. **Mounting**. The generators are to be installed with standard shock and anti-vibration mountings along with holding-down bolts.

f. **Specification of Marine Alternators**. Each of the alternators is to be of 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**. To be supplied as per classification society requirement (LR/BV/DNV/GL):

(a) Maker : To be mentioned

(b) Country of origin and manufacturer: UK, EU Countries, USA, Japan

(c) Model/type : To be mentioned

(d) Number of poles : Four or more

(e) Maximum : Sufficient to cater for action load plus continuous rating 20% reserve. When two DG will be running in parallel

(f) Power factor : 0.8 lagging

(g) Rated Terminal : To be mentioned

(h) Frequency : To be mentioned

(j) No of phases : 3 (three)

(k) Speed : To be mentioned (Preferably not more than 1500 rpm).

(l) Rotor : Dynamically balanced after winding as per BS 49999/50 and with surge voltage suppression device wound on field poles.

(m) Stator : Durable winding in star configuration with high grade electrical steel or equivalent.

(n) Connection : 3 wire, star connection, neutral ungrounded.

(p) Excitation : Shunt with Permanent Magnet Generator (PMG) excitation system/ Auxiliary Regulation Excitation system (ARE).

(q) Ventilation : Self-ventilated, air Cooled, air temperature up to 45°C.

(r) Insulation : F/H

(s) Temperature rise : To be mentioned

(t) Enclosure : IP 23 or better

(u) Number of Bearings: 2 x bearings, re-greaseable type.

(v) 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.

(w) Stator temperature : Shall have embedded temperature detectors sensors in each phase for protection. Temperature readings to be shown on main switchboard.

g. **Auto Voltage Regulator (AVR)**. The AVR is to be of electronic type with three phase sensing devices. Detail description of AVR shall be provided with the quotation. At least following should be included in the AVR:

(1) Maker : To be mentioned
(2) Model/Type of AVR : To be mentioned
(3) Voltage adjustment range : Should be ±10 % of rated value
(4) Sensing input voltage : 3 Phase sensing
(5) Steady-state stability : Should be within 0.5% of rms rated value
(6) Remote hand voltage : Voltage trimmer at trimmer switchboard to adjust voltage by hand trimmer
(7) Over excitation protection : To be incorporated
(8) Thermal trip protection : To be incorporate
(9) Short circuit : As per naval vessel characteristics requirement
(10) Over and under voltage : To be incorporated
(11) Over and under frequency: To be incorporated

h. **Alternator Warning and Shutdown Indications**. To ensure safety following warning and shutdown devices are desirable in each of the alternator panel:

(1) Short circuit condition
(2) Synchronization failure
(3) Over / under voltage indication
(4) Reverse power indication
(5) Under frequency indication

j. **Control Panel**. The following components are to be included with the generator mounted control panel:

(1) Panel lights with ON / OFF switch
(2) Over speed protection device
(3) Visual / audible alarm device.

k. **Generator Control Panel**. All necessary gauges / meters including kilowatt meters are to be fitted in the control panel.

l. **Specification of Prime Mover (Diesel Engine) for Generators**. Marine type with alternate Cooling system arrangement.

(1) Maker : To be mentioned
(2) Country of Origin and Manufacturer: UK, EU Countries, USA, Japan
(3) Model : To be specified
(4) Number of strokes : 4

(5) Number of cylinders : To be mentioned. arrangement
(6) Bore and Stroke : To be mentioned
(7) Compression ratio : To be mentioned
(8) Aspiration : Turbocharged and after Cooled.
(9) Combustion : Direct fuel injection.
(10) RPM : To be mentioned (Preferably not more than1500 rpm).

(11) Brake Mean Effective : To be specified. Pressure (BMEP)

(12) Power : To be mentioned. It should match the requirement of alternator as per marine standard to provide required power at continuous rating and also at overload rating at 45^0C air and 32^0C sea water temperature.

(13) Specific fuel consumption : To be mentioned. at Maximum Continuous Rating

(14) Specific luboil : To be mentioned. Consumption at rated power

(15) Combustion air requirement: To be mentioned.

m. **Governor**. Load sharing and speed control precision electronic governor of approved type is to be provided. The governor should maintain the rpm in steady state and should response instantaneously to any amount of inductive/resistive load change (from 0 to 100% of rated load).

n. **Turbocharger**. Make, model may be specified.

p. **Fuel Oil to be used**. HSD or NATO F-76/Dieso F-76 fuel (To be mentioned).

q. **Lub Oil to be used**. Grade SAE 40 or equivalent to be used, which must be available in Bangladesh local market (To be mentioned).

r. **Starting System**. Generator is to be started by batteries. A necessary arrangement is to be made in this regard.

s. **Time Between Overhauls**.

(1) **Major Overhaul**. To be mentioned.
(2) **Top Overhaul**. To be mentioned.

t. **Accessories**. Standard accessories as required by are to be fitted.

u. **Engine Control and Monitoring Panel**. The following meters and gauges are desirable in the engine mounted engine control and monitoring panel:

(1) **Meters**.
(a) RPM tachometer.
(b) Hour counter.
(2) **Gauges**.

(a) Lub oil pressure gauge.
(b) Sea water pressure gauge.
(c) Fresh water pressure gauge.
(d) Lub oil filter differential pressure gauge
(e) Lub oil temp gauge.

(f) Fresh water temperature gauge.
(g) Fuel oil pressure gauge.

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p. **Safety Devices**. Following safety devices are to be provided in each generator set:

(1) Low lub oil pressure alarm (audio and visual) and auto shut down
(2) High Cooling water temperature alarm (audio and visual)
(3) High lub 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.

q. **Dimension and Weight**. The dimensions and weight of the prime mover are to be mentioned.

615. **Main Switchboard**.

a. **Type**. One main switch board will be fitted with all modern switchgear and centralized load management system. It should have provisions for auto/ manual start-stop, auto parallel and auto load sharing of generators. The switchboard is to be of marine type, floor mounted. Switchboard and internal components shall be 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. **Country of origin and manufacturer**. UK, USA, EU countries and Japan.

d. **Location**. The main switchboard is preferable to the MCR.

e. **Dimension**. The dimension of the switchboard is to be such that enough space is made available on all sides of the switchboard for easy maintenance. To be mentioned.

f. **Construction**.

(1) The switchboard is to be of a drip-proof design, closed from the 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. The dead front type of switchboard 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. All devices are to be accessible from the front. Breakers should be arranged so that they can be easily operated and removed for maintenance. Handrails covered with insulating material are to be provided. All monitors and controls are to be marked with name plates (in English). 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.

(2) Copper bus bars are to have sufficient current carrying capacity for continuous operation. Provision should be made for withstanding mechanical stress caused by short circuit current. Bus bars shall be made of high-quality

copper and identified with color (Red, Yellow and Blue). Bus bar supports shall be moisture resistance.

(3) The switchboard is to be fitted with earthing test facilities.

g. **Panel Arrangement**.

(1) The main switchboard will mainly have two sections. The switchboard is to consist of 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.

(2) **Alternator Panel**. These panels are to be fitted with the control and monitoring system of the alternators. 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 a control section and indication section for parallel running. The generator synchronizing control section and indication section are to be equipped with required number of meters, regulators, switch, breakers, indication light, synchronizing devices etc.

(4) **Generator's Power Feeder Panel.** Each of the alternator control and monitoring sections will have a feeder panel. Each generator's power feeder panel is to be equipped at least with the following devices:

(a) One Insulation resistance meter for each panel with audible alarm.
(b) Required number of MCCBs.

(5) **220V Single Phase Feeder Panel**. One in number feeder panel is to be supplied for distribution of 220V single phase AC. 220V feeder panel is to be fed from Generator voltage 220V transformer for subsequent distribution to 220V services of the RPV. 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 tests the 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 distribution of 115V single phase AC supply. The 115V feeder panel is to be fed from Generator voltage 115V transformer of appropriate capacity. 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 tests the 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 distribution of 24 V DC. Adequate number of rectifiers Generator voltage 24 V DC of appropriate capacity are to be provided. Rectifiers will be fed from the Generator voltage power distribution panels. The 24V DC Feeder Panel will be primarily used for supply and distribution of 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 in another suitable location near the switchboard. 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 Power Supply**. Enough Feeder Panel of required voltage and capacity are to be fitted for distribution armaments power supply. This Feeder Panel will be fed from the generator's

feeder panel. A necessary arrangement is to be made 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.

h. **Alternator Circuit Breaker**. Alternator shall be protected by circuit breaker of appropriate capacity.

j. **Busbar Linking Switch**. A busbar linking switch/breaker of appropriate capacity is to be provided for easily connecting or disconnecting the two sections of the switchboard.

k. **Circuit Breakers for Shore Connection**. An air circuit breaker of appropriate capacity with interlock to prevent running of alternators with shore supply is to be provided in the switchboard.

l. **Safety Devices**. Safety devices are to be arranged as under:

(1) **For Alternator Supply Breakers**. Following safety devices may be incorporated with each of the supply breaker:

(a) Trip release with short and long delay, suitably chosen and set.
(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**. 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.

m. **Interlocking Arrangement**. Interlocking arrangements with the alternators are to be provided so that shore power cannot be fed to busbars when any of the alternators is in operation.

n. **Meters**. All meters mounted on the front panel of the main switch board are to be of flush-mounted square marine type except for synchronizing frequency meters, which are of the reed type. The accuracy of the meters is to be within 1.5 percent of full-scale deflection. The indicating ranges of the voltmeter and ammeter are to be at least 20% and 30% higher than the rated voltage and the rated current respectively. Indicating range of the wattmeter is to have range from 15% reverse power to about 130% of rated wattage. The frequency meter is to have a range from

45 to 65Hz. Rated value is to have red mark on the scale. All meters are to be calibrated before final delivery to BCG.

p. **Labeling.** Circuit breakers, control switches, instruments, indicating lights and terminal blocks etc. are to be clearly labeled to identify their purpose and function. Labels for fuses should in addition indicate the rating of the fuses. Feeder nameplate shall indicate the feeder designation, application and rating current. Each circuit on the switchboard shall be distinctly marked with labels.

616. **Conversion Machinery**.

a. **Transformers**. Required numbers of 400V/115V and 400V/220V transformers, air Cooled dry type, class F, of appropriate capacity are to be provided. Maximum ship's load should not exceed 70% of the capacity of the transformer and capacity of transformers is to consider at least 30% growth potential for future expansion.

b. **Rectifiers (24 V DC)**. The required numbers of 24V DC rectifiers of appropriate capacity are to be provided. Maximum ship's load should not exceed 70% of the capacity of the rectifier and capacity of rectifier is to consider at least 30% growth potential for future expansion.

617. **Shore Supply Arrangement**.

a. **Shore Supply Connection Box**. One shore power connection box of 400V, 50 Hz, 3 phase of appropriate capacity is to be fitted at a suitable place to take power from the shore. However, exact capacity to be decided by bidder on calculation of Shore Load for ship. It should be fitted with 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 of 180m length of appropriate capacity wound on Aluminum roller is to be provided. The outer end of the cable is to be fitted with lugs to facilitate easy connection of the same with the shore supply feeder point.

618. **Battery Switchboard**. One battery switchboard is to be provided for charging and discharging of battery and for distributing DC sources to navigation lights, general alarm system, fire monitoring system, propulsion control circuits, gyro compass, internal communication, radio equipment etc. as emergency supply. In the absence of a main power supply, emergency supply is to be fed to important services by automatic changeover switches of appropriate capacity. The required number of changeovers switches are to be located either on the battery switchboard or in a suitable location near the battery switchboard. The switchboard is to be of a dead front and self-supporting type. The board is to be fitted with the following instrument 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 of fuses.
h. Country of Origin and Manufacturer will be UK/EU Countries/USA/Japan.

619. **Lighting**.

a. **General Lighting**.

(1) The lighting is to be divided into the normal 220V lighting and the 24V DC emergency lighting.

(2) The RPV is to be illuminated with fluorescent lamps as much as possible. LED lights with guards are to be fitted in machinery spaces as necessary.

(3) The weather deck and area around the bridge are to be illuminated with LED light and floodlights according to the warship standard.

(4) In general, the type of lighting fixture and fittings are to be as follows depending upon their locations:

Watertight type	Spaces exposed to the weather, machinery spaces, steering gear room, galley, pantry, deck, stores, etc.
Non-watertight type	Living quarters, wheelhouse, engine control room, equipment spaces etc.
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 polycarbonate globe for fluorescent lamps.

(6) Domestic power supply arrangements are to be made available at various places on the exposed decks for use of portable lights and electrical equipment

(7) All lighting fixtures are to be of Warship Standard.

(8) Illumination lights (with circuits) are to be provided for rigging from ship's mast to forepeak and to ensign staff at 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 lighted with marine type florescent 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 chart light with long folding arm, red lens and dimmer.

(4) Ops room and communication room lighting is to have dimmer facility.

c. **Magazine Lighting**. All electrical fittings in the magazine are to be of an intrinsically safe type and to be of watertight to protect it from water spray. Special fireproof shielded cables and explosion proof lights and fittings are to be fitted inside the magazine. All cables in the magazine must be encased in metal conduit. Switches are to be mounted outside access to the magazine. 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 bridge are to be specified.

e. **Emergency Lighting-Automatic Emergency Lanterns**. Enough automatic emergency lanterns are to be provided in every compartment, passage and internal areas to meet lighting requirement in case of power failure to show passage 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 normal supply fails.

f. **Navigation Lights**.

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

(2) Another source for navigation lighting is 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 as per international maritime regulation and warship standard and are to be in the appropriate location in the RPV as per warship 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 light are to be provided as per IMO / warship standard.

h. **Flood Lights.** The following watertight floodlights are to be provided:

(1) Four portable LED floodlights (each 300W) are to be provided.

(2) Two fixed flood lights of appropriate capacity watt for boat area and two appropriate capacity sealed beam type (24 V DC) boat lowering light.

(3) Two in number of appropriate capacity floodlights are to be installed in front of Bridge to illuminate fox"l area and two at the aft side of the ship to illuminate aft area of the ship.

j. **Search Lights**. Two in number 500W LED signal search lights swivel mounting type are to be provided at a suitable location. These should be remotely controlled from bridges.

k. **Portable Lights**. Following lights of 220V AC are to be provided:

(1) 04 x 100W watertight type with 15 m cord and plug.
(2) 06 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**. Appropriate number of spotlights with red lens and dimmer are to be provided for spot illumination of ops room equipment, displays, repeaters, Captain's chair at bridge and ops room etc.

m. **Red Lighting**. Red lighting (220V, AC, 20W fluorescent) is to be fitted in the spaces when there is exposure of light to the outside due to movement of personnel onboard RPV. Intensity of the light is to be such that minimum of illumination is to be maintained for the movement of the personnel.

n. **Darken Ship Illumination**. Darken ship facilities whereby no internal lighting is to be visible externally even when doors and hatches are opened are to be incorporated in the ship's installation. This facility shall be controlled by a number of darkened switch boxes and door limit switches in suitable positions. A single switch to interrupt supply of all non-essential external lighting in darkened ship's state shall be conveniently located on the bridge.

o. **Dressing Light/ Illumination Circuit**. Watertight ceremonial dressing lighting circuits of required length are to be provided to illuminate ship's side, super structure and fore to aft over the mast. The required number of watertight power receptacles with switch is to be provided on the main deck and superstructure to provide electric power to the dressing light.

620. **Fire Detection System.** A fire detection and warning system shall be installed on board. The system coversthe following zones:

(1) Engine room
(2) Switchboard room
(3) Accommodation lower deck
(4) Accommodation on main deck
(5) Galley

The system is to be provided with heat/ smoke detectors. The system shall provide audible warning throughout the Vessel, by means of thegeneral alarm bells. In case of engine room fire, all ventilation fans, pumps, heaters, etc. can be shut down in accordance with the requirements of the Classification Society.

621. **General Alarm.** A general alarm system is provided. In the wheelhouse a switch is fitted toactivate the general alarm which can be heard all over the Vessel. Bells are installed on the following positions:

(1) Bridge
(2) Accommodation
(3) Engine room (siren and flashing light)

SECTION VII of ANNEX B

NAVIGATIONAL EQUIPMENT/AIDS

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

a. 1 x Gyro Compass.
b. 1 x Magnetic Compass.
c. 2 x Navigation Radar with integrated ECDIS.
d. 1 x Speed Log.
e. 1 x Horns / Sirens.
f. 2 x Echo Sounder with transducer.
g. 2 x GPS.
h. 1 x AIS (To be interfaced with navigational radar and GPS).
j. 1 x Anemometer.
k. 1 x Barometer.
l. 1 x Barograph.
m. 1 x Hygrometer.
n. 1 x EO-IR surveillance system.

702. **Gyro Compass.** One in number Gyro Compass is to be supplied from an internationally reputed company of (Sperry Marine/SAGEM/GEM Electronica/Arma Brown/ANSYS). The proposed gyro (INS/Fiber Optic technology) should provide extremely precise rotational rate information and quick settling time. The gyro platform is to be mechanically aligned accurately to meet manufacturer's installation specification. It is to be interfaced through a Data Distribution Unit (DDU) with navigation RADAR, GPS and other aids as required. The compass is to be supplied with at least following units:

a. One Gyro master unit.

b. 2 x Ship's digital heading marker indicator (Bridge, Steering Gear Room).

c. 3 x bearing repeaters (with Azimuth Circle) in bridge wings and center.

d. One DDU with two inputs (one input from each gyro). The DDU should have automatic and manual selection facilities for selecting inputs. The output of the DDU will go to various units as required.

e. The gyro shall have the facility to interface with the installed other sensors and weapons on board ship.

f. There should be an adequate number of spare ports in DDU for supply to ship's Weapons/Systems and future development.

703. **Magnetic Compass**. Each RPV is to be fitted with a one magnetic compass and located on the bridge/bridge top. There should be at least two repeaters at a suitable location. A telescope mirror is also to be fitted in the bridge position.

704. **Speed Log**. Each RPV is to be fitted with one electromagnetic log. The master speed unit is to be installed in the bridge. The log is to be fitted with at least 03 repeaters. It should have the facility to interface with the Radars, Gyro and as required. Dual axis Doppler Speed log may be installed.

705. **Horns / Sirens**. Each RPV is to be provided with air whistles for navigational purpose to produce a clear, sharp tone of unvarying intensity under all weather conditions regardless of time between blasts as per COLREGs 1972 and appropriate control device for producing desired sound signals to be incorporated.

706. **Echo Sounder**. The ship is to be fitted with two proven types of Echo sounder with transducer consisting of a digital indicator and echo-graphic display. The maximum measuring depth of the echo sounder is up to 800 meters. The transducer is to be of hull flush mounting type and is to be installed at an appropriate place at the bottom of the hull. The transmission cable between transmitter/recorder unit and transducer unit is to be installed separately from main cable route to avoid interference caused by pulse energy generated by other systems. One depth digital repeater is to be installed in the bridge. It should have the facility to interface required.

707. **Navigational Radar**. Two X/S-Band navigational radars with integrated Electronic Chart Display and Information System (ECDIS) must be provided for the each RPV to be installed in Bridge and interfaced with gyrocompass, AIS, GPS, speed log etc. One radar each will have one color tactical display at bridge. It should be by IMO or mil Std. These Radars should be from an internationally reputed company and latest version (Model: Kelvin Hughes/Thales/Leonardo/Furuno).

708. **GPS.** Two in number GPS of an internationally reputed company are to be installed for continuous position and time reference data. The antenna is to be installed in a suitable location and the main unit is to be installed on the bridge. One remote indicator each is to be installed in the bridge and in the Commanding Officer's Cabin. The equipment must be interfaced with the required weapons and sensors on board ship. Country of origin and manufactured from Western country (To be mentioned).

709. **AIS.** One in No AIS must be installed (NEMA standard) in each RPV which needs to be interfaced with Ship's Radar.

710. **Barometer.** One Aneroid Barometer is to be provided and mounted in the bridge.

711. **Barograph.** One barograph is to be provided and fitted in the Commanding Officer's Cabin.

712. **Anemometer.** Each RPV is to be fitted with an Anemometer, which will indicate the relative wind speed and direction. The wind transmitter will be located on the mast and the remote indicators in the ops room and bridge.

713. **Country of Origin and Manufacturer**. UK/ EU Countries/ USA/ Japan.

SECTION – VIII of ANNEX B

COMMUNICATION EQUIPMENT

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

a.	2 x Tx/Rx HF (Military Communication)	- 100-150W
b.	1x Tx/Rx VHF/ UHF	- (Narrow Band)
c.	1 x Tx/Rx VHF/ UHF	- (Wide Band)
d.	1 x Tx/Rx VHF	- Air Band
e.	6x Tx/Rx VHF (Walkie Talkie)	
f.	1 x Satellite Telephone **(Handheld)**	
g.	1 x VSATNET **(Will be provided by BCG)**	
h.	1 x Long-Range Identification and Tracking (LRIT)	
j.	1 x NAVTEX Receiver **(Handheld)**	
k.	1 x Marine Loud Hailer System (Range at least 2000m)	

802. **Distress and Safety Communication Equipment**. The distress and safety communication system will include the following:

a. Standard Global Maritime Distress and Safety System (GMDSS) equipment including Emergency Positioning Indicating Radio Beacon (EPIRB) and Search and Rescue Transponder (SART).
b. Any other radio equipment as per SOLAS or equivalent standard.

803. **Antenna**. All radio equipment is to be installed with the associated antenna. Appropriate radiation signs and warnings are to be placed or marked near the antenna for hazard warning purposes. Antenna location should ensure minimum mutual interference and Electromagnetic compatibility (EMC).

804. **Internal Communication System**. The following types of internal communication means are to be provided:

a. **Internal Telephone System**. Warship Standard Intercom covering all office, accommodation and equipment/ machinery spaces will be provided. The following intercoms are also to be installed in addition:

(1) **Engine Room Intercom**. It will be used to maintain voice communication in noisy places among MCR, Engine Room, Machinery Spaces, Bridge and Emergency Steering Position.

(2) **Combat Intercom**. It will be used to control guns, weapons, sensors and associated control systems from bridge, gun mountings, etc. as required.

(3) **Conning Intercom**. It will be used to give conning order from and to bridge, CO's Cabin, MCR and Propulsion machinery compartment. It should be two-way press to talk type with amplifier system.

b. **Voice Pipes**. Internal voice pipes from bridge to CO’s cabin and ECR/ MCR are to be fitted.

c. **Internet Connection**. Under-mentioned facilities are to be provided for creating a secured internet facility inside the ship:

(1) Marine grade robust router with latest encryption standards with appropriate steel made waterproof rack. Details to be mentioned.
(2) Access Points to cover the whole ship. Details to be mentioned.
(3) Cable terminated on patch panel
(4) Cable terminated on wall sockets in the following spaces:

(a) Two in the bridge
(b) Two in every office
(c) Two in the wardroom
(d) Two in each cabin
(e) All other compartments/ spaces as necessary

(5) A network infrastructure based on Cat 6 SFTP cable with:

(a) Network Quality 10000 Mbps
(b) Patch panel and wall sockets are foreseen with RJ45 sockets
(c)Cable terminated on patch panel

805. **General Broadcast**. The General Broadcast (SRE) of appropriate output power is to be provided for reliable broadcasts of alarms, announcements and entertainment programs. The main unit is to consist of a number of identical amplifiers as required with one spare amplifier, radio tuner including alarm and announcement initiation abilities as well as speakers spread over the RPV. IP-based broadcast systems with network components may be installed. 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 broadcasted from all speaker groups.
b. General announcement shall have the next higher priority.
c. Entertainment programs shall have the lowest priority.
d. The control panel is to be fitted with microphone and monitor speaker and 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.

e. All cabins, mess, living spaces, and wardroom are to be provided with receptacles for connecting TV and radio with national TV, shore cable TV and Radio signals (FM, MW and SW).

806. **Central TV Receiving System**. A central TV receiving system is to be provided for various TVs of the ship. A shore connection point is to be provided for connecting shore Cable TV to the ship's recreation system.

807. **CCTV**. Only 01 camera at Foxl and 01 camera at Quarterdeck with Night Vision high-resolution capability for covering upper deck. CCTV surveillance with at least 15 days of video storage facility. Additional display units/TVs are to be supplied for monitoring the CCTV footages. To be mentioned.

808. **Signaling Projectors**. Two in number (Marine Military Version) signaling projectors (500W, size not less than 10 inches) are to be provided and installed at a suitable location.

809. **Signaling Flag**. Two sets of dressing lines (complete with dressing flags) and two sets of signal flags (Naval Standard) are to be supplied. A suitable locker is to be made for storing the flags.

810. **Flashing Light**. Two in number flash signaling lights (Omni Directional) with necessary accessories will be provided and installed at suitable location in the main mast (yardarm).

811. **Emergency Arrangements**.

a. Alternate power supplies to all communication equipment must be provided.

b. Emergency power supplies to all communication equipment as required.

812. **Documents**. The following documents are to be provided for the above-mentioned equipment in this section:

a. All basic and production drawings, circuit diagrams and fault-finding diagrams.
b. System-wise equipment operation and maintenance manuals and drawings including parts identification list (PIL).
c. Other documents as necessary.

813. **Country of Origin and Manufacturer**: UK/Australia/EU Countries/USA/Japan.

SECTION – IX of ANNEX B

WEAPONS AND ARMAMENTS

901. **Weapons/Armaments**. The RPV is to be capable of being used as a platform for carrying guns. The deck structure in those positions is to be strengthened accordingly. All the weapons (of internationally reputed companies of USA, UK, EU Countries, Japan and Turkey origin and manufactured) will be provided during the construction of the ship by the Shipbuilder/Tenderer. All ammunition, target, test equipment and expert personnel services required for test and trial in receipt of weapons/armaments will be provided by the Shipbuilder/Tenderer. Various state boards, totes, information boards and plot tables are to be arranged in the Bridge to meet BCG requirements. The following weapons/armaments are planned to be fitted:

a. 1 x 30 mm gun (Single Barrel) with local and remote firing facilities for each RPV (USA, UK, EU Countries, Japan and Turkey Origin & Manufactured).

b. 2 x 12.7 mm Gun for each RPV (USA, UK, EU Countries, Japan and Turkey Origin & Manufactured).

902. **30 mm Gun**. The main gun of the RPV will be a 30 mm new generation lightweight rapid-fire gun for anti-surface and anti-air firing. It is to be fitted in the forward part of the ship. The gun is to be provided with the necessary power supply. The gun will be controlled with the following provisions:

a. Remote firing.
b. Single shot firing.
c. Manual/Local firing.
d. Firing Circuit test/Lamp test.

903. **Performance and Technical Data of 30 mm Gun.** The performance and technical data of the main gun are to be as follows:

a. Model/ Type: To be mentioned.
b. Year of manufacture: 2024 or later.
c. System composition: Firing system, feeding system, gun mounting, Laying drive system, electrical system, hydraulic system, ventilation system, protection mechanism.

d. **Gun Barrel**.

(1) Caliber: 30 mm.
(2) Overall length: To be mentioned. Pressure: Actual service pressure and muzzle-pressure to be mentioned.
(3) Projectile velocity: To be mentioned.
(4) Stabilization: Details to be mentioned.
(5) Servo system accuracy: To be mentioned.
(6) Firing failure rate: ≤0.3%

e. Cooling: To be mentioned.
f. Firing mechanism: Percussion type or latest. Details to be mentioned.
g. Recoil mechanism: To be mentioned.

h. Balancing mechanism: To be provided.

j. **Mounting Feature**.

(1) Carriage: To be mentioned.
(2) Gun mounting should have low RCS (against centimeter band radar).
(3) Screw feeder Hoist: To be mentioned.
(4) Revolving Feed Magazine or any other type: To be mentioned.
(5) Empty catching arrangement: To be mentioned.
(6) Loading Mechanism: Loader drum, loading tray, etc. To be mentioned.

k. Training/ Elevation: To be mentioned.

l. Depression: To be mentioned.

m. Speed, deg/sec: To be mentioned.

n. Rate of Fire: To be mentioned.

p. Range: To be mentioned.

q. Ammunition: 30 mm ammunition.

904. **Firing Mode**. In addition to the local firing, the gun shall have the provision to be fired from the bridge remotely. Therefore, firing can be done in the following modes:

a. Remote Firing.
b. Local / Manual from the gun.

905. **Hoist for 30 mm Gun.** The Magazines are to be designed below/nearer to the gun bay and ammunition hoisting arrangements are to be made. The hoisting system should be both electrically and manually driven**.** Detail to be mentioned.

906. **Installation**. The firing thrust and vibration must not affect the performance of precision equipment.

907. **12.7 mm Gun**. 2 x 12.7 mm gun for each ship. Necessary installation facilities (Pintle) to be made for the gun. 01xGun (12.7mm) may be installed onboard and 01xGun (12.7mm) may remain as depot stock. However, if design permits both guns may be installed onboard.

908. **Performance and Technical Data of 12.7 mm Gun**. The performance and technical data of the main gun are to be as follows:

a. Model/ Type: To be mentioned.
b. Year of manufacture: 2024 or later.
c. System composition: Firing system, feeding system, gun mounting, Laying drive system, protection mechanism, etc. Details to be mentioned.

d. **Gun Barrel**.

(1) Caliber: 12.7 mm.
(2) Overall length: To be mentioned.
(3) Pressure: Actual service pressure and muzzle pressure are to be mentioned.
(4) Projectile velocity: To be mentioned.
(5) Stabilization: Details to be mentioned.
(6) Servo system accuracy: To be mentioned.
(7) Firing failure rate: ≤0.3%

e. Cooling: To be mentioned.
f. Firing mechanism: Percussion type or latest. To be mentioned.
g. Recoil mechanism: To be mentioned.
h. Balancing mechanism: To be provided.
j. **Mounting Feature**.

(1) Carriage: To be mentioned.
(2) Gun mounting should have low RCS (against centimeter band radar).
(3) Screw feeder Hoist: To be mentioned.
(4) Revolving Feed Magazine or any other type: To be mentioned.
(5) Empty catching arrangement: To be mentioned.
(6) Loading Mechanism: Loader drum, loading tray, etc. to be mentioned.

k. Training/ Elevation: To be mentioned.
l. Depression: To be mentioned.
m. Speed, deg/sec: To be mentioned.
n. Rate of Fire: To be mentioned.
p. Range: To be mentioned.
q. Ammunition: 12.7 mm ammunition.

909. **Illuminating Flare and Pyrotechnics**. Required quantity of flare and pyrotechnics are to be supplied and a suitable locker for storing them is to be made in each RPV with flooding arrangement from fire main system. To be mentioned.

910. **Small Arms**. Under-mentioned small arms with their ammunition and accessories including web equipment are to be supplied onboard each RPV:

a. 6 x Pistols 9mm (BERETTA 92FS)
b. 2 x Signal Pistols

911. **Pistol Cupboard and Armory for Small Arms**. Pistol Cupboard is to be made in the Commanding Officer's cabin for the storing facility of pistols and an armory is to be made for the under-mentioned small arms and all respective ammunition in each RPV:

a. 10 x SMGs
b. 10 x Rifle
c. 2 x Signal Pistol
d. 3 x LMGs

912. **Magazine**. Suitable magazine for stowage of ammunition for guns. The magazine should have a stowage capacity of approximately 2500 rounds of ammunition for the 30mm gun and approximately 2500 rounds of ammunition for 12.7mm guns. The magazine is to be constructed as watertight compartments with air conditioning facilities. The magazine is to fulfill the following safety criteria for the prevention of fire:

a. Magazine is to be fitted with a flooding system. Flooding of the magazine may be considered freely through a sea valve or through the fire main. Valves of this system are to be provided with deck-operated rod gearing. The pumping-out system is also to be fitted.

b. Magazine is also to be fitted with a sprinkling system.

c. Fire retarding paint is to be used in magazines. These may be painted internally with non-inflammable 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 in the bridge and at a position adjacent to the gangway staff in the harbor.

e. All furniture in the magazine is to be manufactured of metal including the magazine contents and/or state boards and key boxes.

f. All electrical fittings in the magazine are to be of intrinsically safe type and to be of watertight to 0.1 bar to protect it from water spray. Special fire proof shielded cables and explosion proof lights and fittings are to be fitted inside the magazine. All cabling in magazine must be encased in metal conduit.

g. The details about the magazine are to be provided.

h. Magazine should be of class rule complied.

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.

913. **RU Locker for 30 mm Gun.**

a. RU locker will be in the close vicinity of the gun.

b. RU locker will have capacity to store sufficient number of rounds of ammunition for 30 mm guns (To be mentioned).

c. Dual locking arrangements will be provided on door.

d. Fire retarding paint will be used in RU lockers.

e. RU lockers are to be placed in such a way so that they do not receive direct sunlight as a preventive measure against overheating.

f. RU lockers should be according to class rule.

914. **RU Lockers for 12.7 mm Gun**.

a. RU lockers should be in the close vicinity of the guns.

b. RU lockers should have capacity to store approximately 200 rounds of ammunition for 12.7 mm guns.

c. Dual locking arrangements are to be provided on doors.

d. Fire retarding paint is to be used in RU lockers.

e. RU lockers are to be placed in such a way so that they do not receive direct sunlight as a preventive measure against overheating.

f. RU lockers should be according to class rule.

915. **Ammunition Handling**. Necessary means are to be provided so that the ammunition can be loaded aboard, struck down and removed in the most efficient manner considering the safety and speed of handling.

916. **Bulletproof Helmets, Bulletproof Jackets, Web Equipment and Anti Flash Hoods.** Bulletproof helmets, bulletproof jackets and anti-flash hoods are to be provided for 12 (twelve) personnel for each RPV. Web equipment is to be provided as required.

917. **Supply of Ammunition and Documents for Gun**. Local Shipbuilder/Tenderer is to supply the required number of ammunitions for conducting Proof firing of Guns in Bangladesh. In addition 500 rds ammo for each 30mm gun (total-2500 rds for 5xRPVs) and 500 rds ammo for 12.7mm gun (Total 2500 rds for 5xRPVs) has to be provided. Besides following documents, need to be supplied. Price to be quoted separately for supply of ammunition and maintenance training of guns (Details to be mentioned). Details are as follows:

a. Required number of ammunitions to be supplied for proof/test firing for each RPV each gun.

b. Operation and maintenance training for 30mm and 12.7mm Gun.

c. OEM recommended fast moving spare parts for 5 years of smooth operation of the guns.

d. Manual of supplied guns.

e. Parts catalogue and colored PIL.

918. Non-Lethal Threat Engagement System: Non-Lethal Threat Engagement System must be on boarded with each vessel. It must be remotely operated. Non-Lethal Threat Engagement System is designed to effectively Detect, Hail, Deter, and Disrupt a potential threat in excess of 1,500 meters. It must integrate in a compact gyro stabilized rugged pan and tilt assembly specifically designed for both stbd/port fixed installations. The listed payloads:

a. 150 dB SPL(A) Directional Speaker.
b. Field-proven 5W dimmable green Laser Dazzler.
c. Powerful 12 million candelas white light.
d. Daylight and IR Cameras with Video Tracking.
e. Laser Range Finder (Optional).

SECTION – X of ANNEX B

ACCOMMODATION, STORES AND AMENITIES

1001. **General Arrangement**. The RPVs are to be arranged with the following accommodation, living and working spaces, tanks and stores:

a. **Accommodation**.

(1) 01 x single berth cabin each for CO with attached lavatory.
(2) 02 x double berth cabins for officers with common lavatory.
(3) 01 x cabin with adequate cupboard/almirah for 6 x senior ratings crew with common lavatory.
(4) At least 3 x cabins with adequate cupboard/almirah for 18 x junior ratings (per cabin 6 persons) crew with common lavatory.

b. **Utility Compartments.**

(1) Wardroom for officers.
(2) Wardroom pantry for officers.
(3) Senior Rates' common dining and recreation.
(4) Junior Rates' common dining and recreation.
(5) Common Galley for all.
(6) Officers' Sanitary Space.
(7) Senior Rates' Sanitary Space.
(8) Junior Rates' Sanitary Space.

c. **Working Compartments and Rooms**.

(1) Closed bridge with chart table, navigation and communication equipment etc. with bridge wings on port and starboard side.
(2) MRO/Signal office (includes a locker with combination safe for stowage of classified communication documents).
(3) Ships and Store Office.
(4) Ventilation and air conditioning room/space.
(5) Steering gear compartment.
(6) Main and auxiliary machinery compartments.
(7) Machinery control room.
(8) Diving equipment stowage facility.
(9) Magazine room.
(10) Sick bay and medical stores.
(11) Boson's store.
(12) Books and BR's locker.

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

(1) Pyrotechnic locker.
(2) Dry provisions and condiments rooms.
(3) Vegetable lockers.
(4) Rope and rigging locker.
(5) Paint store.

(6) Anchor chain/cable locker.
(7) Marine engineering store.
(8) Gunnery store.
(9) Fore peak tank/store.
(10) Ready use ammunition lockers.
(11) Small arms locker.
(12) Mess gear locker.
(13) Cleaning gear locker.
(14) 6 x Breathing Apparatus lockers.
(15) Communication store and 2 x Flag Lockers.
(16) Spare parts locker (Engineering, Electrical and Radio electrical).
(17) Crockery lockers (Galley, Ward Room, dining).
(18) Navigation Equipment locker (preferably at bridge).
(19) Minimum 10 x Lockers for storing official documents at all working spaces.
(20) Web equipment locker.
(21) Lockers for storing all supplied life jackets.

1002. **Tanks**. Tanks for fuel oil, lub oil, fresh water, dirty lub oil, foam, etc. are to be provided as necessary. Most of the tanks are to be constructed as integral part of the hull. The tanks are to be fitted with filling and discharge lines and valves, gauges, vents, etc. The fuel oil capacity should be such that RPVs can run at least an endurance of 1500 nm at cruising/economical speed. The fresh water tank capacity is to be approximately 10 tons.

1003. **Stores**. Store capacity is to commensurate with the requirements of complement and endurance. The stores are to be fitted with shelves, racks, bins and other facilities as required. Adequate on board fast moving & ready use spares' storing capacity is to be available. The dry provisions, fresh provisions capacity should be for 15 days and 5 days respectively (As per DPP). The capacity of stores to be mentioned.

1004. **Key Boards**. One in number armament key board with key hooks and identification tags will be fitted in Captain's cabin. A general key board will be fitted in the wardroom. One in number radiation hazard key board is to be fitted in suitable place.

1005. **Diving Store**. Air-conditioned stowage and charging facilities is to be provided for 6 in number diving sets with necessary gears and a portable diesel air compressor suitable to supply diving air is to be placed in a suitable location. The diving store should have provision for charging the diving sets with safe compressed air supplied from compressor. Diving sets are to be supplied by shipbuilder. One Breathing Air Compressor is to be provided with each RPV.

1006. **Flag Lockers**. Two in number flag lockers of suitable size with 70 pigeon holes to be fabricated and fitted on the upper deck near to the mast.

1007. **Miscellaneous.** Following items are to be supplied:

a. Gangway table with suitable wooden state board is to be provided as per BCG standard.

b. At least 2 wooden plungers and one Boson's chair for painting the shipside and the mast.

c. Ropes for halyard, heaving line, boat fall etc. of various sizes and length.

d. Two in number boat hooks.

e. One in number gangway buoy stand.

f. One in number officers' state board.

g. Watch and station bill in the lobby.

j. One in number bronze ship's bell.

k. Two deck washing machine (Water Jet).

1008. **Furniture**. Furniture and facilities of accommodation, living spaces and working places are to be adequate for number of personnel and of good marine quality and should be supplied under material package from foreign shipbuilder. Materials of furniture are to be of good quality, fire retardant. Metallic furniture may also be used as required.

1009. **Furniture Application for Living Spaces and Bridge**.

Name of Place	Allocated Person	Description	Remarks
CO's cabin	1	This cabin should possess 1 x Single tier bed with drawer and bedding items, 1 x combination safe, desk, revolving chair, easy chair, table, wardrobe, book rack, mirror, filing cabinet, sofa with arm rest, 1 x armament key board, hat and coat hook, clock, ash tray, waste basket, shoe rack, linen for cabin etc.	1 X Lavatory (Includes Toilet, Wash Basin and Shower) With Standard Fittings. 1 X GPS Monitor (Slave of master GPS in the Bridge), 2 X Echo sounder display, 1 x Barometer & Course/ Hdg indicator

Name of Place	Allocated Person	Description	Remarks
Officers' cabin	4	Two double cabins. Each cabin with 2 x bed with drawer and bedding items, desk, arm chair, writing desk with chair, wardrobe, book rack, mirror, filing cabinet, hat and coat hook, clock, ash tray, waste basket, shoe rack, linen for cabin etc. 1 cabin is to have one combination safe of suitable size.	Each attached lavatory (includes 1x commode, 1 x shower cabinets, 1 x wash basins with standard fittings.
Ward Room	8	One wardroom with dining table, 1 x 8-seater sofa arrangement, 8 dining chairs, hat hook board, serving window, magazine rack, clock, waste basket, first aid box, important keyboard, pistol cupboard, crockery locker, linen for cabin, information board etc. arrangement for items mentioned.	1 x pantry

Senior Ratings' room	6	In one accommodation compartment (with attached lavatory) consisting with drawers and bedding items, writing desk with chair, armless chairs, wardrobe, book rack, mirror, hat and coat hook, linen for cabin, shoe rack, clock, waste basket etc.	Each attached lavatory (includes 1x commode, 1 x shower cabinets, 1 x wash basins with standard fittings.
Junior Ratings' room	18	In three accommodation compartments consisting with drawers and bedding items, writing desk with chair, armless chairs, wardrobe, book rack, mirror, hat and coat hook, shoe rack, clock, waste basket etc.	Each attached lavatory (includes 1x commode, 1 x shower cabinets, 1 x wash basins with standard fittings.
Crew's Dinning	30	Standard dining facility with chairs, tables, wash basins and suitable crockery locker. Arrangement for items mentioned.	
Bridge	-	1 x chart table with drawer, dimmer light (red) and curtain, 1 x radio table (with a chair and red dimmer light on both sides), 1 x captain's chair with arms, 1 x helmsman seat, 1x Engine operator's seat, 1 x state board, 1 x clock, 1 x nav equipment locker, file/book cabinet (2-drawer), inclinometer, book rack, first aid box etc.	
Gangway	-	1 x gangway table, 1 x officer's state board, 1 x lifebuoy with stand, 1 x hygrometer in a box, 1 x barometer and a wall clock.	Includes one post each for shore telephone and general broadcast.
Lobby	-	1 x Notice board, 1 x General key board, 2 x watch and station bill board, 2 x display board and a first aid box.	

1010. **Furniture for Exposed Deck and Other Spaces**. Following furniture are to be provided on exposed deck:

a. 2 x Aluminum life jacket boxes.
b. 2 x Wooden thermometer box.
c. 4 x First aid boxes.
d. 2 x Stretchers with securing arrangement
e. 6 x revolving chairs.
f. Shelves, cupboards etc. for galley.
g. Shelves, cupboards etc. for wardroom pantry.

1011. **Fittings of Sanitary Space**. All exposed metal fixtures, taps, valves, accessories etc. are to be of chromium coated brass. Rubber washers are to be fitted between all China plumbing fixtures and metal supports.

a. **Wash Basin.** Stainless steel wash basins with spring loaded tap, S-trap and rubber ring are to be provided.

b. **Water Closet.** The water closets are to be of pedestal type for all officers and crews. Sea water flush and one fresh water tap are to be provided.

c. **Shower.** The showers are to be of swivel shoe head type.

d. **Toilet Cabinet**. The material of the toilet cabinet is to be of moulded plastic with shelf inside and mirror on the hinged door. Mirror lamp is to be fitted over toilet cabinet.

e. **Others.** Wall mounted lavatory rack and mirror with the wash basins, soap holder, towel rack, hooks, toilet paper holder, sea water tape, etc. are to be provided as necessary.

1012. **Galley**. The galley should have facility to Cook food for minimum 35 persons. Adequate supply and exhaust blowers are to be fitted to have good ventilation. All the galley fittings and equipment shall be made of stainless steel. Following equipment and furniture is to be provided:

a. A stainless-steel work top with double sink.
b. Cupboard underneath the sink.
c. 2 x Electric Cooking ranges each with 2 hot plates and electric chimneys over the Cooking ranges. Both the equipment should be able to run by ship's generator supply and shore electric supply.
d. 1 x Steam rice Cooker (should be able to run by ship's generator supply and shore electric supply).
e. 1 x Stainless steel sink.
f. 1 x Stainless steel working table.
g. 1 x chopping table.
h. Fresh and sea water tapes as required.
i. 1 x Water purifier fitted with drinking water line.
j. 2 x Deep fridge (Freezer).
k. 2 x Domestic fridges.
l. 1x microwave oven and 1x electric oven.
m. All other standard equipment need to be provided and to be mentioned.

1013. **Ward Room Pantry**. The followings are to be provided in the Ward Room pantry:

a. 1 x Refrigerator.
b. 1 x stainless steel Micro wave oven.
c. 1 X stainless steel Blender.
d. 1 X stainless steel Bread toaster.
e. 1 X Stainless steel sink.
f. 1 x Water purifier fitted with drinking water line.
g. 1 x Sandwich maker.
h. 1 x Coffee maker.
i. All other standard equipment need to be provided and to be mentioned.

1014. **Mess Traps, Mess Utensils and Galley Implements**. Mess Traps, mess utensils and galley implement will be supplied for Wardroom, Senior Rates' mess, Junior Rates' mess and ship's galley as per existing authorization for the ship's complements at the time of first outfit (for this BCG standard have to be followed). The Shipbuilder/Tenderer should provide the following items (for officers and for crews) 1(one) Set in full per RPV as per approved design by the BCG with the delivery of the RPVs:

SCALE OF MESS UTENSILS AND GALLEY IMPLEMENTS FOR OFFICER'S MESS- RPV

SER	Nomenclature	Deno / Scale	No of Person 1-50
			1
1	Block Wood for Chopping	No	1
2	Board Paste Wooden	No	1
3	Bowl Salad	No	2
4	Bowl Finger	No	5
5	Box Ice with Ice tong	No	1
6	Boxes Cash	No	1
7	Brush Crumb	No	1
8	Bucket Pantry Plastic	No	1
9	Blender Electric	No	1
10	Canister sugar/Tea	No	2
11	Chopper Meat	No	1
12	Cloth table D D white	No	5
13	Colanders Aluminum	No	1
14	Cruet Set Complete	No	1
15	Chafing Dish Oblong	No	-
	Chafing Dish Double	No	2
16	Coffee Maker Electric	No	1
17	Cooking Spud Small	No	3
	Cooking Spud Medium	No	2
	Cooking Spud Large	No	-
18	Cup Shrimp Cocktail	No	10
19	Cup Ice Cream	No	10
20	Cup Tea	No	10
21	Cup Egg	No	5
22	Cup Coffee	No	12
23	Candle Stand	No	2
24	Decanter	No	1
25	Dish Butter	No	1
26	Dish Flat 30-31cm	No	2
	Dish Flat 35-36cm	No	2
	Dish Flat 40-41cm	No	1
27	Dish Pie Aluminum	No	1
28	Dish Vegetable with Cover	No	2
	Dish Curry	No	2
29	Duster Blue Check	No	12
30	Fork Carving	No	-

	Fork Serving	No	5
31	Fork Dessert	No	10
	Fork Fruit	No	10
32	Fork Table	No	10
33	Fork Fish eating	No	10
34	Fork Pickle	No	1
35	Frill Cloth Navy Blue/Whit	Meter	-
36	Goblet	No	10
37	Hand Gloves Cotton White	Pairs	4
38	Ice Cream Scooper	No	1
39	Jar Pickle Glass with cover	No	1
40	Jug Aluminum	No	1
	Jug Water Glass	No	1
41	Juice Maker	No	1
42	Kettle Electric	No	1
	Kettle Tea Aluminum	No	1
43	Knife Butter	No	1
	Knife Butter Spreading	No	5
44	Knife fish Eating	No	10
45	Knife fruit	No	10
	Knife Dessert	No	10
46	Knife Carving	No	-
47	Knife Table	No	10
48	Knife Bread	No	1
49	Knife Cook	No	2
50	Ladle Cook Wooden	No	1
	Ladle Aluminum	No	1
51	Machine Mincing	No	1
52	Machine Potato Chipping	No	1
53	Machine Potato Pinching	No	1
54	Menu Stand with BCG Crest	No	2
55	Napkin Table	No	10
56	Number Stand with Plastic Numerical	No	-
57	Opener Bottle/Tin	No	2
58	Oven Electronics/Electric	No	1
59	Pan Frying	No	2
60	Plate breakfast	No	12
61	Plate Dessert	No	12
62	Plate Dinner	No	12
63	Plate Pudding	No	12
64	Plate Soup	No	12
65	Plate Quarter	No	12
66	Pot Cking 15 cm X 13cm with cover	No	2
67	Pot Cooking 25 cm X 12cm with cover	No	2
68	Pot Cooking 28 cm X 18cm with cover	No	2

69	Pot Cooking 35 cm X 17cm with cover	No	2
70	Pot Cooking 45 cm X 23cm with cover	No	1
	Pot Cooking 66 cm X 46cm with cover	No	-
	Pot Cooking 76 cm X 63cm with cover	No	-
71	Pot Sugar	No	2
72	Pot Milk	No	2
73	Pot Tea	No	2
74	Pot Coffee	No	2
75	Potato Masher	No	1
76	Pestle and Mortar	No	1
77	Pressure Cooker	No	1
78	Sandwich Maker	No	1
79	Saucer Coffee	No	12
80	Saucer Tea	No	10
81	Sieves wire	No	1
82	Slicer Egg	No	1
83	Spoon coffee	No	10
84	Spoon Ice Cream	No	10
85	Spoon Tea	No	10
86	Spoon Soup	No	12
87	Spoon Serving	No	5
88	Spoon Iron/S S Small	No	2
89	Spoon Table	No	10
90	Spoon Dessert	No	10
91	Spoon Rice Serving	No	2
92	Sauce Boat	No	1
93	Sherry Glass (Toasting)	No	10
94	Stone Curry with roller	No	1
95	Strainer Gravy Conical	No	1
96	Tawa Iron	No	1
97	Tin Flour/ Atta/Rice with cover	No	2
98	Toaster Rack& partition	No	1
99	Toaster Electric	No	1
100	Tumbler Table	No	12
101	Tray Serving Oblong	No	1
102	Tub Washing	No	1
103	Waiter Round 25 cm	No	1
104	Whisks Egg	No	1
105	Weighing Machine Spring/Dial 0-50 kg	No	1

SCALE OF MESS UTENSILS AND GALLEY IMPLEMENTS FOR SHIP'S COMPANY MESS- RPV

Ser	Nomenclature	Deno/Scale	No of Person 1-50
			1
1	Air Pot 4 Ltr	No	1
2	Block wood for chopping	No	1
3	Bucket pantry, Aluminum		
	a. 10-12	No	1
	b. 15-20	No	-
4	Chopper Meat		
	a. 30 cm	No	2
	b. 25 cm	No	1
	c. 20 cm	No	2
5	Cloth Table	Meter	10
6	Colanders Aluminum	No	1
7	Cooking Spud		
	a. 91cm	No	2
	b. 111cm	No	1
	c. 137 cm	No	-
	d. 152 cm	No	-
8	Cup Tea	No	40
9	Dish Rice SS, 10 Men Serving	No	4
10	Dish Vegetables SS, 10 Men Serving	No	2
11	Dish Dall SS, 10 Men Serving	No	4
12	Dish Curry SS, 10 Men Serving	No	2
13	Drum Sugar SS with Cover		
	a. 25 kg	No	1
	b. 50 kg	No	-
14	Drum Tea SS with Cover		
	a. 25 kg	No	1
	b. 50 kg	No	-
15	Drum Salt SS with Cover		
	a. 25 kg	No	-
	b. 50 kg	No	-
16	Drum Dall SS with Cover		
	a. 25 kg	No	1
	b. 50 kg	No	-
17	Drum Milk powder SS with Cover		
	a. 25 kg	No	1
	b. 50 kg	No	-
18	Jug		
	a. Aluminum, 2 Ltr	No	1
	b. SS, 2 ltr	No	2
19	Kettle Tea, SS 4 ltr	No	1
20	Knife Cook SS		

	a. 15 cm	No	1
	b. 30 cm	No	2
	c. 35cm	No	1
	d. 40cm	No	1
	e. 45 cm	No	1
21	Ladle Cook Brass		
	a. 30 cm	No	2
	b. 45 cm	No	2
	c. 76 cm	No	1
	d. 91 cm	No	-
	e. 121 cm	No	-
22	Meat Mincing Machine		
	a. Light Duty	No	1
	b. Heavy Duty	No	-
23	Mixture Machine	No	1
	a. Light Duty	No	-
	b. Heavy Duty	No	2
24	Pan Frying		
	a. 40 cm (Diameter)	No	2
	b. 60 cm (Diameter)	No	2
	c. 82 cm (Diameter)	No	2
25	Piston and Mortar	No	1
26	Pot Cooking With Cover		
27	a. 15cmX13cm	No	2
	b. 25cmX12cm	No	3
	c. 28cmX18cm	No	3
	d. 35cmX17cm	No	4
	e. 45cmX23cm	No	3
	f. 51cmX33cm	No	3
	g. 65cmX37cm	No	-
	h. 66cmX46cm	No	-
28	Saucer Tea	No	40
29	Slicer		
	a. Light Duty	No	1
	b. Heavy Duty	No	-
30	Spoon Serving SS		
	a. Rice	No	4
	b. Vegetable	No	2
	c. Dal	No	4
	d. Curry	No	2
31	Spoon Tea SS	No	40
32	Strainer	No	2
33	Tawa, Iron		
	a. 15 cm	No	2
	b. 40 cm	No	2
	c. 60 cm	No	2
	d. 82 cm	No	-

34	Water Glass Drinking Ss	No	40
33	Weighting Machine Spring/Dial		
	a. 0-50 kg	No	1
	b. 0-100 kg	No	-

1015. **Ship's Office and Office Equipment**. To meet the ship's administrative functions, ships office is to be equipped with the followings:

a. Cabinets and shelves for correspondence files and publications stowage.
b. One in number combination safe of suitable size.
c. 4 x All-in-one computers (with UPS and all accessories), 3 x Laptop, 3 x printers, 2 x scanner and 2x Photocopier machine (Heavy Duty). A Local Area Network (LAN) facility is to be provided. All Laptops and Computers has to be USA/UK/EU/Japan origin.
d. One desk with desk light, one file cabinet, two chairs with arm, two chairs without arms, etc.

1016. **Laundry Space**. The laundry space shall be provided with:

a. 2 x Washing machines (each 15kg capacity) with dryer facility to be provided.

1017. **Sick Bay**. The sick bay shall be provided with:

a. 1 x bunk with mattress and the lower bunk with drawers.
b. 2 x lockers for medicines.
c. 1 x small refrigerator.
d. 2 x medical waste disposer.
e. 1 x oxygen cylinder and concentrator arrangement
f. 1 x X-Ray report check board
g. 1 x fast aid box
j. 1 x BP check machine
k. 1 x stethoscope
l. 1 x nebulizer set up
m. Any other necessary item to be provided (To be mentioned)

1018. **Damage Control Stations.**

a. DCHQ (Incorporated in combined Central Control Station).

b. Damage Control Headquarters shall be located in MCR/ Junior rating dining room and fitted with good communication facilities. Communication facilities provided for shall include:

(1) General Broadcast System.
(2) Auto Telephone.
(3) Intercom.

c. Thermal Imaging Camera (TIC) (complete with battery, carrying case and 02 x spare battery for each RPVs.

d. **Incident Board.** The damage control headquarters shall be provided with sufficiently large erasable Perspex board for the following:

(1) Incident board.
(2) Counter flooding board.

(3) Main services board.
(4) Electrical state board.

Stores, fittings, facilities, etc. and their safety arrangements, control and monitoring gadgets etc. as stated above are inclusive, but not limited to with respect to a naval ship’s requirement of construction and operation.

SECTION – XI of ANNEX B

MISCELLANEOUS

Spare parts, Tools, Test Equipment and Accessories

1101. **Spare Parts**. A package of OEM recommended spare parts (with item wise price) for five years operation are to be provided during delivery of the RPV's for smooth operation and maintenance of ship's machinery. A list with item wise price to be quoted with the offer. The Shipbuilder/Tenderer shall have to ensure guarantee of unrestricted supply of spare parts for at least 15 years during signing of contract. Following equipment are to be considered for offering spare parts:

a. Main engines and gearboxes, generator sets, steering system, auxiliary machinery and air conditioning plants.
b. All Electrical and electronic equipment.
c. All Sensors and armaments.
d. Propulsion and power generation control and monitoring system.
e. All Deck machinery.
f. General systems and shafting.
g. Any other spare parts deemed necessary by the Local Shipbuilder/Tenderer.

1102. **Special Tools**. Following special tools are to be supplied with each RPV of 5 (five) RPVs. List should include following test equipment but not limited to:

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. 2 x 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 electrical system).
v. 2X Safety Harness for working in 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. 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.
ac. Tools for electrical works one box in each ship
ad. 2 X marine type lead lamp with extension line (for engine and machinery space)

1103. **Test Equipment**. Following test equipment for each RPV of 5(five) RPV's are to be provided by the Shipbuilder/Tenderer. List should include following test equipment but not limited to:

a. 2 x Digital Multi meter
b. 2 x Weber tester.
c. 2 x Clamp tester
d. 2 x Megger.
e. 2 x Digital tachometer.
f. 2 x Hydrometer.
g. 2 x AC gas pressure tester.
h. 2 x Rechargeable infrared temperature measuring equipment (temperature measuring range 10^0C to 1200^0C).

1104. **Standard Accessories**. Standard accessories will include all items and accessories which are essential to operate but not limited to each main engine, generator sets, gearbox, Pollution control system, auxiliary machinery, air conditioning plant, pumps, compressors etc.

1105. **Manuals and Drawings**. Plans and drawings of construction, hull, outfitting, accommodation, general arrangement, machinery, electrical, weapons, operation and maintenance manuals (workshop levels) including parts catalogue etc. will be provided by the bidder. All the plans and documentation, name plates, caution/ identification plates will be written in English. Following workshop level maintenance manuals/documents and drawings of all machinery and equipment including their control system (3 copies of each in English) should be provided:

a. **Operation, Maintenance manuals-schedules and workshop level repair manual of**:
(1) Main engine.
(2) Generator set.
(3) Propulsion system and shafting.
(4) Steering system.
(5) AC plants.
(6) Gearbox.
(7) Major electrical equipment.
(8) Communication equipment.
(9) Auxiliary equipment.
(10) Internal communication equipment.
(11) Sensor used at various machinery, equipment and systems.
(12) Pollution control system.

b. Installation drawings, system and components diagrams for **Main Engines and their local and remote controls**.

c. Installation drawings, system and components diagrams for **Gearbox and its control**.

d. Installation drawings, system and components diagrams for **Main Diesel Generators, Emergency Diesel Generator and their local and remote controls**.

e. Installation drawings, system and components diagrams for **Propulsion System and Shafting**.

f. Installation drawings, system and components diagrams of **Steering System**.

g. Ship's Data Book.

h. All control circuit diagram and Electric circuit drawing/ diagrams and fault-finding flow charts of all machinery, equipment and system (main engine, generator, Propulsion, shafting, gearbox, Ac plant, steering system, Pollution control system, communication equipment, navigational equipment, internal communication system etc.) to be provided.

j. **Drawings**. Following drawing of the proposed RPVs are to be provided:

(1) General arrangement drawing with principal particulars.
(2) Line plan.
(3) Scantling of hull and superstructure.
(4) Trim and stability booklet.
(5) Layout of Armament and magazine.
(6) Shell expansion drawing.
(7) Docking plan and Alternate drawing plan.
(8) Arrangement of tanks.
(9) Ventilation and air conditioning diagram.

1106. **Parts Catalogue**. Part catalogue both in hard copy and soft copy in English language and internationally recognized Part number (as per OEM standard) of the following major equipment to be provided:

a. Main engine.
b. Generator set.
c. Gearbox.
d. Propulsion system and shafting.
e. AC plants.
f. Major electrical equipment.
g. Communication equipment.
h. Auxiliary equipment (various pumps and compressors).
i. Internal communication equipment.
j. Sensor used at various machinery, equipment and systems.
k. Pollution control system.
l. Steering system.
m. Deck machineries.

1107. **Inclining Experiment, Factory Acceptance Test (FAT), Harbour Acceptance Trial (HAT), Sea Acceptance Trial (SAT) and Training**.

a. **General.** Prior to keel laying, basic design and production drawing of hull and super structure is to be finalized by the approval of the classification society and BCG‟s representative (Project Implementation Team). During construction, all production drawing and installation diagrams are to be approved by the BCG's representative (Project Implementation Team) and on completion of each work, inspection is to be done jointly by BCG's representative, builder and class (as applicable). Test and trials of individual equipment and machinery at various level i.e. FAT, STW (Setting to Work/Installation), HAT, SAT etc. as applicable are to be done jointly by the BCG's representative and the Shipbuilder/Tenderer. Test/trial procedure of each stage are to be submitted to the BCG'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 is to be submitted and approved by the BCG. Shipbuilder/Tenderer shall submit test protocol to BCG 8(eight) weeks prior to conduct FAT/ Test/ Trial.

b. Before conducting trial, BCG will approve test protocol as per standard procedure. All test/ trial shall be complied at Normal Loading condition.

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

d. **Test and Trial.**

(1) **Factory Acceptance Test (FAT) and Pre-Shipment Inspection (PSI)**. All machinery, equipment and items are to be factory tested. To this effect, copies of FAT/PSI certificates are to be provided. Provisions are to be kept so that 4 x BCG representatives for each group can attend FAT/PSI for main engines, generators, Guns and 3 x BCG representatives for Radar at the manufacturer's premises or manufacturer's authorized premises in the same country. Shipbuilder/Tenderer will bear all expenses regarding international travel, accommodation and meals for the FAT of BCG team. All expenses related to internal travel within the manufacturer's country, reception and arrangement for entry into the country/concerned area for FAT/PSI will be borne by the Tenderer/ shipbuilder. Foreign shipbuilders/foreign design package supplies should arrange a visit for purchasing representative to design package material supplier's premises before signing the contract.

(2) **Harbour Acceptance Trial (HAT)**. Performance test of all machinery and equipment are to be carried out with BCG personnel on board. During on board test, all machinery, equipment and all piping and wiring systems supplied and / or installed on board will be tested as far as practicable and should meet the international classification society's requirement (as applicable). The harbor trial of the following machinery is to be carried out prior to sea trial and the test should meet the international classification society's requirement (as applicable).

(3) **Sea Acceptance Trial (SAT)**. Sea Acceptance Trial of the ship will be conducted by the Shipbuilder/Tenderer in presence of BCG acceptance team and manufacturers of concerned major equipment on board at Normal Load condition mentioned in article 103. Sea trial will be carried out to verify the correct operation of the systems and machinery during underway and to check that the test performance is in compliance with the RPV specification. The trial will include:

I. **Maximum Speed Trial.** Maximum speed trial will be carried out for 1 (one) hour duration. Maximum speed will be determined by running the ship for 30 minutes at a stretch with the tide and 30 minutes against the tide at a stretch and arithmetic mean speed of the two runs. Both the run should be conducted without any interruption.
II. **Maximum Continuous Speed**. Maximum continuous speed trial will be carried out for 2 hour duration. Maximum continuous speed will be determined by running the ship for 1 hour at a stretch with the tide and for 1 hour against the tide at a stretch and arithmetic mean speed of two runs. Both the run should be conducted without any interruption.
III. Crash stop.
IV. Slam start (Stop to full ahead lever).
V. Endurance test at economic speed (2 hours).
VI. Turning circle.
VII. Testing of all sensors for determining their sensitivity and maximum range and coverage

VIII. Proof firing of all guns.

IX. Ship's gun firing trial will have to be arranged by the Local shipbuilder. Necessary ammunition and target is to be arranged by the Shipbuilder/Tenderer.

1108. **Personnel Training** Theoretical and practical Training on operation and maintenance and troubleshooting of ship's machinery and equipment is to be arranged by Shipbuilder/Tenderer. Local training shall be arranged by the Shipbuilder/Tenderer. Shipbuilder shall arrange classroom, all training aids, materials related to training and all costs related to the training will be borne by Shipbuilder/Tenderer.

a. **Local Training.** Shipbuilder/Tenderer shall arrange minimum 6(six) weeks department wise separate training on operation and maintenance of major machinery (main engine, generator, propulsion system, steering system, AC Plant), auxiliary machinery (various pumps and compressors, ventilation system etc.), deck machinery, as well as crew familiarization for ship crews in separate group. Following criteria mentioned below have to be considered by the Shipbuilder/Tenderer during designing training program consulting with OEM and BCG authority:

(1) The Shipbuilder shall arrange OEM/shipbuilder representative as instructor for the mentioned duration training program.

(2) Training of different departments (engine room, electrical and radio electrical, ordnance, seaman, medical etc.) shall be arranged separately in group. Training may proceed either simultaneously or chronologically.

(3) Training schedule mentioned below shall be considered by the Shipbuilder/Tenderer:

Ser	Department	Training Topic	Duration	Total duration
1	Engineering Department (Mechanical)	Ship design, drawings, architecture and ships knowledge	2 working days	45 working days
		Main engine with gearbox (construction description, working principle, system diagram, operations, engine assemble-disassembly layout drawing, trouble shoot, maintenance and overhauling, parts identification)	10 working days	
		Generator Prime Mover (Main and emergency) (construction description, working principle, system diagram, operations, engine assemble-disassembly layout drawing, trouble shoot, maintenance and overhauling, parts identification)	4 working days	
		Propulsion and CPP Mechanical system (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	3 working days	

		Steering system and Mechanical system (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	3 working days	
		AC Plant and ventilation system (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	3 working days	
		Refrigerators	1 working days	
		Fuel transfer system including fueling and defueling (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	2 working day	
		Fresh Water distribution system and domestic RO plant (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	2 working days	
		Auxiliary and Deck fitted machineries e.g. Winch, Capstan, Windlass, Davit crane (system and layout drawing, operations, parts identification, trouble shoot, repair and maintenance)	4 working days	
		RHIB boat (system and layout drawing, operations, parts identification, operation, trouble shoot, repair and maintenance)	2 working days	
		JEMINI/IB boat (system and layout drawing, operations, parts identification, operation, trouble shoot, repair and maintenance)	1 working day	
		Portable oil pollution control system (operation and maintenance)	1 working day	
		DCFF including Damaged stability implication, Engine room Fixed firefighting system	4 working days	
		Hull structure paint scheme and maintenance	1 working day	
		Ship Familiarization-Practical training	2 working days	

2	Electrical and radio electrical Department	Main engine control, alarm and monitoring system (System and layout diagram, circuit diagram, operations, parts identification, trouble shoot, repair and maintenance)	5 working days	45 working days
		Switchboard, Power distribution system and power conversion machineries (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	5 working days	
		Generator Prime Mover electrical system (Main and emergency) (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	3 working days	
		Propulsion and CPP electrical and control system (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	3 working days	
		Steering system and control system (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	3 working days	
		Auxiliary and Deck fitted machineries e.g., Winch, Capstan, Windlass, Davit crane (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	1 working days	
		Navigational Radar with integrated ECDIS, HF/ VHF sets, VSATNET, LRIT, (System and layout diagram, circuit diagram, operations, parts identification, trouble shoot, repair and maintenance)	3 working days	

		AC Plant and ventilation system (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	2 working days	
		Refrigerators	1 working days	
		Fuel transfer system including fueling and defueling (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	2 working days	
		Fresh Water distribution system and domestic RO plant (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	2 working days	
		Auxiliary and Deck fitted machineries e.g. Winch, Capstan, Windlass, Davit crane (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	3 working days	
		RHIB boat (system and layout drawing, operations, parts identification, operation, trouble shoot, repair and maintenance)	2 working days	
		JEMINI/IB boat (system and layout drawing, operations, parts identification, operation, trouble shoot, repair and maintenance)	1 working day	
		Portable oil pollution control system (operation and maintenance)	1 working day	
		Intercom system and General broadcast system (System and layout diagram, circuit diagram, operations, parts identification, distribution flow chart, trouble shoot, repair and maintenance)	2 working days	

		DCFF including Damaged stability implication, Engine room Fixed firefighting system (NOVEC)	4 working days	
		Ship Familiarization-Practical training	2 working days	
3	Seaman Department	Towing operation and RAS operation	2 days	15 working days
		Anchor and cable work	1 day	
		Hull structure paint scheme and maintenance	1 day	
		30 mm Gun and 12.7 mm Gun (basic operation)	3 days	
		Main engine (Bridge control)	1 days	
		Auxiliary and Deck fitted machineries e.g. Winch, Capstan, David crane (System operation)	2 days	
		RHIB boat (operation)	2 days	
		JEMINI/IB boat (operation)	1 day	
		Navigation and communication equipment (Operation)	1 days	
		Ship Familiarization-Practical training	1 day	
4	Gunnery, ordnance and radio electrical department	30 mm gun operation and maintenance	7 working days	15 working days
		12.7 mm gun operation and maintenance	4 working days	
		DCFF including Damaged stability implication	2 working days	
		Ship Familiarization-Practical training	2 working days	
5	Domestic (Cook and Stewart) department	Galley equipment (Equipment operation and operator level training)	5 working days	5 working days
6	Medical department	Medical equipment (Equipment operation and operator level training)	5 working days	5 working days
7	Steward department	Pantry equipment (Equipment operation and operator level training)	5 working days	5 working days

APPENDIX 1 TO ANNEX B TO
TENDER SPECIFICATION FOR
CONSTRUCTION OF RPV FOR BCG

ARTICLE-WISE COMPLIANCE SHEET ON THE PURCHASER'S
TENDER SPECIFICATION OF RPV
(TO BE FILLED BY THE TENDERER)

SECTION- I of ANNEX B **INTRODUCTION AND GENERAL PROVISIONS**			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
101	Functions		
102	General Description		
103	Displacement		
104	Dimensions		
105	Speed		
106	Country of Origin and Manufacture		
107	Design of RPVs		
108	Propulsion and maneuvering		
109	Power		
110	Seaworthiness		
111	Complement		
112	Construction		
113	Design		
114	Place of construction		
115	Delivery		
116	Special features		
117	Mission Length		
118	Signature		
119	Armament		
120	Navigation, Direction and RADAR		
121	Communication		
122	Accommodation		
123	Logistics Arrangement		
124	Miscellaneous		
125	Classification		
126	Standard		

SECTION- II of ANNEX B DESIGN AND DRAWING			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
201	Introduction		
202	Design Philosophy		
203	Design Criteria and Standards		
204	Classification		
205	Certification		
206	List of Drawings		
207	Fees for Certification		
208	Drawing Package		
209	Special Condition		

SECTION- III of ANNEX B HULL AND STRUCTURE			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
301	General		
302	Construction		
303	General Arrangement		
304	Hull Structure		
305	Hull Materials		
306	Scantling		
307	Frames		
308	Side Longitudinal		
309	Deck Longitudinal		
310	Bulkheads		
311	Bulkhead Stiffeners		
312	Main and Auxiliary Machinery Mounting		
313	Engine Room Hatches		
314	Anchor Chain /Cable Locker		
315	Sea chests / Sea Inlets		
316	Hawse pipe		
317	Construction of Tanks		
318	Superstructure		
319	Foundation for Guns		
320	Magazine		
321	Small Arms stowage		
322	Primary Surface Preparation and Shop Priming		
323	Painting		
324	Cathodic Protection		
325	Insulation and Deck Coverings		
326	Signature		
327	Hull Designation and Markings		

SECTION- IV of ANNEX B DECK AUXILIARY AND ACCOMMODATION OUTFIT			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
401	General		
402	Weather Protected Assembly		
403	Workmanship and Quality of Materials and Fittings		
404	Construction Supervision		
405	Fittings Insulation		
406	Insulation		
407	Watertight Doors		
408	Miscellaneous Non-Watertight Doors		
409	Hatches		
410	Manholes and Covers		
411	Windows		
412	Side Scuttles and Portholes		
413	Plan for Doors, Windows and Openings		
414	Ladders		
415	Bulwark, Rails and Stanchions		
416	Floor Plates and Gratings		
417	Fenders		
418	Mast		
419	Jack Staff and Ensign Staff		
420	Navigation Light Boxes		
421	Air Inlet Gratings		
422	Air Dust Covers		
423	Bollards		
424	Fairlead		
425	Cleats and Eyebolts		
426	Chocks		
427	Towing Bitt		
428	Towing Rope		
429	Mooring/Berthing Hawsers		
430	Reels		
431	Riggings		
432	Canvas		
433	Shore Gangway / Brow		
434	Pilot Ladder		
435	Locks, Keys and Tags		
436	Key Boards		
437	Ship’s Boat and Safety Appliances		
438	Fire-fighting		
439	Fire and Smoke Detector		
440	Damage Control Equipment		
441	Diving Equipment Room		

442	Flag and Navigation Shape Locker		
443	Miscellaneous		
444	Deck Machinery		
445	Steering Gears		
446	Anchor and Chain Cable		
447	Capstan		

SECTION- V of ANNEX B ENGINEERING MACHINERY, EQUIPMENT AND SYSTEMS			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
501	General		
502	Propulsion System		
503	Technical Specification of Main Engine		
504	Ambient Condition		
505	Design and Record of Sales		
506	Maintenance Facility		
507	Automatic Protection Devices		
508	Machinery Control, Monitoring and Alarm System		
509	Classification		
510	Engine Load Test		
511	Specific Fuel Consumption (SFC)		
512	Fuel System		
513	Lubricating Oil System		
514	Cooling Water System		
515	Starting System		
516	Shutdown System		
517	Combustion Air System		
518	Exhaust System		
519	Mountings		
520	Torsional Vibration Damper		
521	Power Transmission		
522	Gear Box		
523	Propeller		
524	Technical Particulars of Shafting		
525	Thrust block		
526	Sensors, Indicators and Gauges		
527	Instruments to be Mounted on Main Engines		
528	Remote Control from MCR		
529	Remote Control from Bridge		
530	Ship’s Compressed Air System		
531	Generating Plant, Diesel Engines for Generators		

532	Emergency Diesel Generator		
533	Bow Thruster (Optional)		
534	Fresh Water System		
535	Fire main System (Ship's Main Sea Water System)		
536	Sea Chests / Sea Inlets		
537	Fuel Oil Tank and System		
538	Lubricating Oil Tank and System		
539	Air Conditioning and Ventilation		
540	Domestic and Deep Fridge		
541	Piping		
542	Heat Exchangers		
543	Air and Exhaust Arrangement		
544	Filling, Sounding and De-aeration System		
545	Pollution Control System		
546	Protection Against Marine Pollution		
547	POL and Chemicals		

SECTION – VI of ANNEX B ELECTRICAL EQUIPMENT, MACHINERY AND SYSTEMS			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
601	General		
602	Ship's Main Power System		
603	Schematic Diagram		
604	Electrical Load Analysis		
605	Provision of Power for Future Equipment		
606	Alternative Power		
607	Emergency Power		
608	EMI Compatibility		
609	Equipment and Items of Electrical System		
610	Conversion Machinery		
611	Shore Supply Arrangement		
612	DC Power Backup		
613	Main Generator Set		
614	Emergency Generator Set		
615	Main Switchboard		
616	Conversion Machinery		
617	Shore Supply Arrangement		
618	Battery Switchboard		

619	Lighting		
620	Fire Detection System		
621	General Alarm		

SECTION- VII of ANNEX B NAVIGATIONAL EQUIPMENT / AIDS			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
701	General		
702	Gyro Compass		
703	Magnetic Compass		
704	Speed Log		
705	Horns / Sirens		
706	Echo Sounder		
707	Navigational Radar		
708	GPS		
709	AIS		
710	Barometer		
711	Barograph		
712	Anemometer		
713	Country of Origin and Manufacturer		

SECTION- VIII of ANNEX B COMMUNICATION EQUIPMENT			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
801	External Communication Equipment		
802	Distress and Safety Communication Equipment		
803	Antenna		
804	Internal Communication System		
805	General Broadcast		
806	Central TV Receiving System		
807	CCTV		
808	Signaling Projectors		
809	Signaling Flag		
810	Flashing Light		
811	Emergency Arrangements		
812	Documents		
813	Country of Origin and Manufacturer		

SECTION- IX of ANNEX B WEAPONS AND ARMAMENTS			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
901	Weapon / Armaments		
902	30 mm Gun		
903	Performance and Technical Data of 30 mm Gun		
904	Firing mode		
905	Hoist for 30 mm Guns Integration		
906	Installation		
907	12.7 mm Gun		
908	Performance And Technical Data of 12.7 mm Gun		
909	Illuminating Flare and Pyrotechnics		
910	Small Arms		
911	Pistol Cupboard and Armory for Small Arms		
912	Magazine		
913	RU Locker for 30 mm gun		
914	RU Locker for 12.7 mm gun		
915	Ammunition Handling		
916	Bulletproof Helmets, Bulletproof Jackets, Web Equipment and Anti Flash Hoods		
917	Supply of Ammunition and Documents		

SECTION- X of ANNEX B ACCOMMODATION, STORES AND AMENITIES			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
1001	General Arrangement		
1002	Tanks		
1003	Stores		
1004	Key Boards		
1005	Diving Store		
1006	Flag Lockers		
1007	Miscellaneous		
1008	Furniture		
1009	Furniture Application for Living Spaces and Bridge		
1010	Furniture for Exposed Deck and Other Spaces		
1011	Fittings of Sanitary Space		
1012	Galley		

1013	Ward Room Pantry		
1014	Mess Traps, Mess Utensils and Galley Implements		
1015	Ship's Office and Office Equipment		
1016	Laundry Space		
1017	Sickbay		
1018	Damage Control Stations		

SECTION-XI of ANNEX B MISCELLANEOUS			
Art. No	**Description**	**Shall comply or not**	**Deviation (if any)**
Spare Parts, Tools, Test Equipment and Accessories			
1101	Spare Parts		
1102	Special Tools		
1103	Test Equipment		
1104	Standard Accessories		
1105	Manuals and Drawings		
1106	Parts Catalogue		
1107	Inclining Experiment, Factory Acceptance Test (FAT), Harbour Acceptance Trial (HAT), Sea Acceptance Trial (SAT) and Training		
1108	Personnel Training		

Section 8. Particular Specifications

Notes on Particular Specifications

If an item of the Works is not covered in the General Specifications or if any specification clause requires that further details as to precise requirements for the particular Works are to be given or needs to be modified or clarified then these should be reflected in the Particular Specifications. Where the Particular Specification clause replaces or clarifies an existing clause of the General Specification then the same clause numbering system need to be followed.

As per Technical Specification-Section 7

Section 9. Drawings

Notes on Drawings

Insert here a list of Drawings. The actual Drawings, including site plans, should be attached to this section or annexed in a separate folder. The Drawings shall be dated, numbered and show the revision number.

As per Technical Specification-Section 7

Enclosure-4

Bill of Quantities (As per Section 7- Technical Specification)

Name of Works: Construction and Delivery of 5x Riverine Patrol Vessel (RPV) for BCG.

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
1	Cost of CFD Analysis (If required)	1	Lot			0	0
2	Cost of Classification for Design approval (DNV/GL/Lloyds/ BV)	1	Lot			0	0
3	Cost of Classification for survey (DNV/GL/Lloyds/ BV)	1	Lot			0	0
4	Cost of Certification	1	Lot			0	0
5	Cost of Basic Design: The RPV shall be designed based on proven hull design. Maximum 10% deviation in dimensional parameters may be allowed. In case of offered design exceeds 10% allowance, detail CFD analysis shall be provided while signing the contract. Country of origin of the proven design: USA, UK, EU Countries, Canada, Turkey.	1	Lot			0	0
6	Cost of Detailed Production Design	1	Lot			0	0
7	Purchase of Approved Steel Plate (AH-32/AH-36) as required by classification society.	125	Ton			0	0
8	Purchase of Approved Aluminum Plate (5083, 6061, 6063, 6082) as required by classification society	25	Ton			0	0
9	Triclad Joint between steel hull and aluminum plate (Class approved)	250	Meters			0	0
10	Stainless Steel	1000	kg			0	0
11	Hatches for Engine Room weathertight (Soft patch)	2	Nos.			0	0
12	Chain Locker, Hawse Pipe and other accessories required for construction	1	No.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
13	Main Sea Chest	2	Nos.			0	0
14	Auxiliary Sea Chest	1	No.			0	0
15	Construction of Tanks	1	Lot			0	0
16	Foundation for Guns: All guns' foundations will be made to withstand thrust on the deck for avoiding distortion of the structure and the armament/equipment. Guns foundations and supporting structures are to be stiffened to prevent misalignment which would interfere with operation of the weapon/equipment and is to preclude excessive vibration on the foundation.	1	Lot			0	0
17	Magazine room for stowage of ammunitions for guns. Full consideration will be given to safety, strength, rapidity of handling, weight saving, economy of space and elimination of features that may damage the ammunitions	1	Lot			0	0
18	Small arms locker equipped with suitable stowing facility with accessories and ammunitions are to be made as convenient.	1	No.			0	0
19	Steel/Aluminum plates and sections are to be cleaned and cleared of mill scale by blast cleaning and coated with a primer prior to fabrication. The shop primer shall not be harmful to the welding work and will be compatible to the subsequent coatings. Epoxy coating of International Paint (IP/SIGMA/JOTUN) should be applied in the hull area. Suitable Epoxy/Conventional paint is to be used in other areas as acceptable to BCG. The paint scheme and dry film thickness should be as per the recommendation of the paint manufacturer for new building ship. Detail paint schedule for different areas of	6000	Liters			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	the RPV is to be submitted with the tender quotation. All other specification as per tender						
20	Appropriate Cathodic protection (Preferably Zinc Anode) to protect the underwater hull and fittings is to be provided. The number and types of anodes should be suited for at least 3(three) years operational use in sea water. However, Shipbuilder/Tenderer may offer any other suitable arrangement for cathodic protection and anti-fouling purpose.	150	kg			0	0
21	Class Approved Fire Insulation for Bulkhead and Deck (Ceramic/ Rockwool) with fitting accessories	400	m2			0	0
22	Thermal Insulation for Bulkhead and Deck (Glass wool) with fitting accessories	600	m2			0	0
23	Honeycomb/ insulation core Fire grade panel with approved class certificate. The manufacturer should provide detailed joiner drawing	450	m2			0	0
24	Deck Covering: Within galley, wash places, toilets and other wet accommodation spaces, deck coverings are to be of non-slip ceramic tiles. In other accommodation spaces, offices, lobby, etc. deck coverings are to consist of suitable underlay covered with resin-based Polyurethane.	300	m2			0	0
25	All signatures should be minimum. Sharp bended (right angled) superstructure/high temperature object on upper deck should be avoided. The shafting and propellers are to be designed for low noise. All heavy vibrating machinery including engines should be mounted on special vibration and noise absorbing mounts. Thermal	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	radiation, noise and vibration signatures of the RPV at all operating range should meet the standard as per Classification Society rule.						
26	Hull Designation and markings as per article 327 of Section 7.	1	Lot			0	0
27	Weather Protected Assembly as per article 402 of Section 7	1	Lot			0	0
28	The workmanship on the hull and fittings throughout shall be completed by Shipbuilder/ Tenderer in accordance with applicable Classification society standards. Care shall be taken by Shipbuilder/ Tenderer to ensure fair lines, smooth surfaces and neat welding. The Shipbuilder/ Tenderer shall have to maintain high standard regarding clean-keeping, safety and environmental protection during outfitting of marine grade goods, materials and equipment.	1	Lot			0	0
29	All bolts, chains, fittings and other small equipment exposed to seawater shall be of stainless steel or aluminum or at least of galvanized steel. Use of silicon-based materials shall be minimized.	1	Lot			0	0
30	Watertight Doors	2	Nos.			0	0
31	Weathertight Doors with side scuttle	4	Nos.			0	0
32	Joiner Doors/ Fire Doors	20	Nos.			0	0
33	Hatches (as per article 409 of Section 7)	6	Nos.			0	0
34	Engine Room Escape hatch (500 x 500 mm) with coaming height 600 mm	1	No.			0	0
35	Inspection Hatches	10	Nos.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
36	Closing Devices Air Ducts: Necessary fire damper and other closing devices should be provided	2	Nos.			0	0
37	Manholes and Covers as per article 410 of Section 7	12	Nos.			0	0
38	Windows: All windows are to be made of aluminium alloy anodized frame with heat treated safety glass. These may be of fixed type or opening hinged type." Glass as per article 411(f) of Section 7	15	Nos.			0	0
39	Clear view screen	3	Sets			0	0
40	Wheelhouse/ bridge windows with window wiper(s) are provided with a fresh water washing system. The system is fed by a separate tank which offers the possibility of using additives. The tank has to be filled manually.	1	Lot			0	0
41	Electrical (24V) pantograph window wipers shall be fitted on all front wheelhouse windows. The window wipers shall be controlled in groups. The wipers in each group shall be synchronized.	4	Nos.			0	0
42	Solar screens of the rolling type shall be fitted to all the wheelhouse windows, excluding doors.	15	Nos.			0	0
43	Side Scuttles and Portholes as per article 412 of Section 7	14	Nos.			0	0
44	Stairs, ladders, steps, railing and platforms are to be generally positioned in accordance with the General Arrangement Plan. Throughout the Vessel sufficient grab rails and steps are provided for the safety and convenience of the crew. Suitable inclined ladders and vertical ladders are to be installed as required. All footsteps of inclined ladders should be of rectangular flat shape with nonskid arrangement for slip resistance.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	Accommodation and deck houses are to be provided with climbing steps and hand grip.						
45	Portable pilot rope ladder	2	Nos.			0	0
46	Bulwark shall be installed around the main deck. The material of Bulwark shall be steel. Steel hand rails, storm rails and stanchions will be provided around the open decks and the superstructure where necessary. At each side an opening/ any suitable arrangement shall be provided to the RHIB. The opening shall be closed with stainless steel wire. Details of height, width and thickness of the bulwark to be mentioned with the quotation.	1	Lot			0	0
47	In machinery spaces and stores, non-skid aluminium checkered plate of minimum thickness of 4mm floor plates are to be provided. Gratings are to be installed for easy maintenance.	2000	kg			0	0
48	Special attention shall be given to the arrangement, materials and fastening of the fenders by local Shipbuilder/Tenderer. Fenders shall be positioned in accordance with the General Arrangement Plan and shall be of high-quality products, selected for durability.	1	Lot			0	0
49	Mast as per article 418 of Section 7	1	No.			0	0
50	Collapsible jack staff and ensign staff of steel pipe with necessary fittings are to be provided at bow and stern respectively. Hooks are to be made and fitted with staffs for rigging dressing lines.	2	Nos.			0	0
51	Navigation Light Boxes as per tender document	2	Nos.			0	0
52	The engine room, ventilation air inlet gratings (mist eliminator type) and outlet gratings are to be installed.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
53	Arrangement for closing the inlet and outlet gratings for ventilation of engine room is to be made with watertight steel covers.	1	Lot			0	0
54	Adequate number of double/ single 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. Bollards are to be strong enough to withstand heavy load of side towing or cyclonic weather. Number and position of bollards and fairleads are to be made according to the requirements of BCG (considering the tidal range and berthing arrangement of BCG berths). S.W.L of bollards of different positions are to be mentioned.	6	Nos.			0	0
55	Adequate number suitable fairleads are to be provided. The fore and aft fairleads will be suitable for receiving the mooring lines and the towing ropes.	6	Nos.			0	0
56	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 appropriate location.	4	Nos.			0	0
57	Chocks	2	Nos.			0	0
58	Suitable towing bitt and bollards are to be fitted on the fore peak and aft deck.	2	Nos.			0	0
59	Towing rope approximately 153 mm diameter of 220 m in length Polyamide rope should be strong enough to take similar ship with same displacement under tow. However, offered rope's diameter and length to be adhered Seamanship manual and design of the ship. Details of the rope to be mentioned.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
60	8 x berthing hawser (size 127mm x 110m); Details of the rope to be provided.	8	Sets			0	0
61	2 x spring hawser; As per relevant size mentioned in Seamanship manual. Details of the rope to be provided.	2	Sets			0	0
62	8 x heaving lines are to be provided; As per Seamanship manual. Details of the rope to be provided	2	Sets			0	0
63	Appropriate numbers of reels for securing berthing hawsers, towing rope, spring hawser, shore supply electric cables etc. are to be provided.	1	No.			0	0
64	Sufficient halyards in the main mast have to be catered for hoisting various flags and ensigns (such as naval ensign, signal flags, commissioning pendent, battle ensign, board pendent etc.).	1	Lot			0	0
65	Two (2) sets of portable awnings (one for regular use and the other one for ceremony) are to be provided as required for spaces at forward and aft main deck. The same is to be provided on upper deck if design permits.	2	Sets			0	0
66	Equipment, armaments and sensors requiring protection on the weather decks are to be provided with water proof canvas covers.	1	Lot			0	0
67	Shore gangway as per article 433 (a-b) of Section 7	1	No.			0	0
68	Locks, Keys and Tags as per article 435 of Section 7	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
69	One in number “Armament Keyboard‟ and one in number” Important Keyboard‟ is to be fitted in 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. Similar smaller key board will be provided in various work spaces as required.	1	Lot			0	0
70	a. 1 x Rigid Hull Inflatable Boat (RHIB) as ship’s boat for minimum 6 persons with Diesel propulsion system to attain speed not less than 25 knots (with full complement of crew) is to be provided on the main deck or at stern. The boat with appropriate deck crane for hoisting/ lowering arrangement or stern launching/ recovery arrangement/equipment is to be supplied. Other specification as per article 437(a) of Section 7	1	No.			0	0
	b. 1 x JEMINI/ Inflatable Boat (IB) as ship’s boat for minimum 6 persons with outboard Engine to attain speed not less than 25 knots (with full complement of crew) is to be provided onboard. Appropriate deck crane/davit for hoisting/lowering arrangement or stern launching/ recovery arrangement/equipment is to be supplied. Other specification as per article 437(b) of Section 7	1	No.			0	0
71	Life Rafts: 2 x 25 men capacity inflatable life rafts with cradle and accessories are to be provided.	2	Nos.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
72	Sufficient numbers of life buoys (as required), life jacket (as required), hazardous duty life jackets (12 in no.), survival-suits (as required), distress Signal and first aid kit (in various position of ship including machineries space, detail location to be mentioned) etc. are to be provided as per GMDSS and Seamanship manual (BR 64) standard following class and SOLAS standard.	1	Lot			0	0
73	Emergency Life Saving Apparatus (ELSA)	25	Nos.			0	0
74	VHF telephony with DSC	1	No.			0	0
75	MF telephony with MF DSC	1	No.			0	0
76	Inmarsat ship earth station with EGC (Enhanced Group Call) receiver	1	No.			0	0
77	NAVTEX receiver	1	No.			0	0
78	Float-free satellite EPIRB	2	Nos.			0	0
79	Search and rescue locating device: SART/AIS-SART	1	No.			0	0
80	Hand-held waterproof VHF radio	1	No.			0	0
81	The engine rooms will be provided with any suitable fixed firefighting/fire suppression system approved by Classification Society which commensurate the volume of engine rooms and can be operated outside the engine rooms from a suitable remote position. Number of bottles and their capacity are to be specified.	1	Lot			0	0
82	A pressurized sea water fire main system with sufficient number of fire hydrants is to be laid in the RPV with two dedicated robust fire pumps (to use alternately) attached with hydrants throughout the ship. The fire main pressure, actual number and location of fire hydrants are to be specified.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
83	Every fire hydrant is to be provided with adequate length of fire hose with end couplings and combined spray-jet nozzle stored in boxes in suitable place nearby.	1	Lot			0	0
84	Required number of portable fire extinguishers and refills for extinguishing solid, liquid and electric fire are to be provided.	1	Lot			0	0
85	Breathing Apparatus	10	Nos.			0	0
86	Fearnaught suits for firefighters are to be supplied.	5	Nos.			0	0
87	Portable Firefighting Pump: diesel firefighting pump of 30-40 tons/hour capacity with accessories is to be supplied (Brand and type to be mentioned).	2	Nos.			0	0
88	Flooding and Sprinkler system/ Any suitable firefighting / fire suppression system approved by Classification Society is to be provided for each magazine/ ammunition store.	1	Lot			0	0
89	Fire Blanket	1	No.			0	0
90	Fire Axe	1	No.			0	0
91	Line Throwing Appliances	1	No.			0	0
92	Rescue Net	2	Nos.			0	0
93	Suitable fire and smoke detection system will be fitted. All working space, accommodations and machinery compartments should have sensors. The monitor of the system will be located at bridge/any suitable place.	1	Lot			0	0
94	Submersible Pump (5 m3/hr)	1	No.			0	0
95	Submersible Pump (3 m3/hr)	1	No.			0	0
96	Damage control equipment, tools and materials	2	Sets			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
97	Portable emergency lamps (Re-chargeable)	6	Sets			0	0
98	Following diving equipment should be provided:- Scuba regulator.- Single cylinder set complete with 12-liter cylinder, crossflow valve and adjustable backpack.- Buoyancy compensator.- Mask Ventura or equivalent.- One (1) pair fin.- Snorkel with swivel mouthpiece.- Regulator console complete with pressure gauge, depth gauge and compass.- Surface pressure test gauge with purge.- Complete dry suit (gloves, boots, mono-piece, hood).- Knife.- Surface sign.- Weight belt complete.- Wrist computer, wrist compass and diver slate.- Waterproof torch light.- Rash guard.- One no. spare 12-liter short cylinder.	8	Sets			0	0
99	2 (Two) in Nos. flag lockers with 70 pigeon holes and one in number navigation Shape locker of suitable size are to be fabricated and fitted on the upper deck near to the mast.	2	Nos.			0	0
100	Following items are to be supplied: a. 2 (Two) in Nos aluminum three tier steps is to be provided for using at the end of gangway ladder during high/low water when the ship is alongside jetty. b. At least 2 (Two) in Nos wooden plungers and one Boson's chair for painting the shipside and the mast. c. Ropes for halyard, heaving line, boat fall etc. of various sizes and length. d. 2 (Two) in number boat hooks (with securing arrangement at main deck). e. Watch and station bill board in the lobby.	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	f. Deck tackles (with arrangements) for hoisting anchors manually. g. 1(One) in number bottom chain. h. Emergency cutting gears (such as axe in forecastle and after deck). i. 1(One) digital camera with optical zooming facility. j. 1(One) in number gunmetal ship's bell. k. 1(One) break water arrangement at Fox'l of the ship. l. A suitable quantity of Night Vision high-resolution cameras and NVR are to be fitted for covering the whole ship under CCTV surveillance with at least one month of video storage facility. m. 1(One) in number Stern looking video camera system for the bridge with a display in the bridge.						
101	One electro-hydraulic steering gear system including standard accessories of appropriate capacity and design according to internationally recognized classification society's requirement for double plated twin rudders is to be installed in the steering gear room. Primary steering is to be from bridge with secondary steering position located in the steering gear room. The steering system is to be operated with ship's main power supply. The details will be as per article 445 of Section 7.	1	Set			0	0
102	Twin rudder as per class approval and provided with class certificate	2	Sets			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
103	Anchor and Chain Cables: 1/2 number stockless anchors of adequate size with necessary chain cables and other accessories including chain compressor and strong back are to be provided. The anchors and cables installation must meet the class requirement. The Vessel shall be provided with two anchor housings.	1	Set			0	0
104	1 (one) in number capstan of adequate capacity is to be installed on the forecastle deck for handling chain cables/mooring ropes. The capstan is to be operated with ship's main power supply. In case of power failure, capstan shall have manual operation facility. The capstan should provide with warping head. Class certificate should be provided.	1	No.			0	0
105	Two in number marine diesel engines capable of developing sufficient total power required to attain the maximum speed of not less than 22 knots, Max continuous speed shall be as per design and Cruising/ Economical speed approximately 15 knots (Number of engines with propellers to be mentioned with the quotation). However, RPV shall be capable to operate in single engine. Max continuous speed shall be mentioned for two engines and single engine operation.	2	Nos			0	0
106	Each engine will be connected with Controllable Pitch Propeller (CPP)/ Fixed Pitch Propeller (FPP) to per arrangements of engines reduction gear box. Gearbox/s should preferably have trailing capability for unlimited period. If required extra trailing pump/Cooling arrangement is to be provided. All other requirement as per article 522 of Section 7. Type approved product certificate should be provided.	2	Nos.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
107	Torsional Vibration calculation of the engine and gearbox.	1	Set			0	0
108	Free standing/ flexible coupling between engine and gearbox	2	Nos.			0	0
109	Propeller made of Nickel-Aluminum-Bronze alloy or any other suitable material is to be fitted for the nominal marine diesel engine torque. The propellers are to be class approved by the internationally recognized classification society. The detailed technical information including weight, diameter, pitch, BAR, Numbers of blades, material etc. are to be included in the offer. Shaft locking gears are to be provided for each shaft. Arrangements should be made such that, if one shaft is not used, it may be locked properly or may be allowedto rotate without any difficulty for single engine operation. All other requirement as per article 524-525 of Section 7. Duplex shaft material should be provided.	2	Nos.			0	0
110	Instruments to be Mounted on Main Engines: Sensors and displays with alarm system for sea water, fresh water, lub oil systems to be incorporated.	2	Nos.			0	0
111	Remote Control from MCR: As per article 528 of Section 7	2	Nos.			0	0
112	Remote Control from bridge: As per article 529 of Section 7	2	Nos.			0	0
113	Ship’s Compressed Air System	1	Lot			0	0
114	Bow Thruster (Optional)	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
115	Freshwater will be supplied through a hydrophore system consisting of two pumps with one hydrophore tank. It should be arranged to provide a continuous supply from storage tanks to general water supply system and machinery feed water system throughout the ship. One pump and hydrophore tank should serve as main and another pump will remain as standby. Fresh water supply is to be given to galley, sanitary spaces, dining space and engine room. Water purifier (with RO-UV facility) to supply drinkable water from the fresh water tank shall be fitted at different position of the ship (accommodations, messing area, galley, pantry, ECR, ward room, etc. where deemed necessary).	1	No.			0	0
116	Fresh Water filling system	1	Set			0	0
117	Fire main System (Ship's Main Sea Water System)	1	Set			0	0
118	Fuel Oil Tank and System	1	Set			0	0
119	Fuel Oil Transfer Pump: 20 m^3/h and pressure 3 bar	1	Set			0	0
120	Propulsion engines, diesel generator engines, Emergency Diesel generator and gearboxes are to use same type of lubricating oil (SAE 40 or equivalent, which must be available in 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 engine sump will be discharged via a hand pump to a dirty lub oil tank. The lub oil system for diesel engines, generators, Emergency diesel generator and reduction gears will be arranged in accordance with the requirement of manufacturer. One in	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	number lub oil transfer pump of adequate capacity is to be incorporated in the system.						
121	Air Conditioning System: The vessel shall be provided with central single duct type air conditioning system covering all living rooms, dining room, office room, wheelhouse etc. The system shall consist of one set of air handling unit having 100% of total required air load capacity. Two complete automatic sets of compressors/ condensing units shall be provided (one working and one standby). Country of origin and manufacturer: UK, EU countries, USA, Japan. All other details as per article 539(a) of Section 7. Capacity 100,000 BTU.	1	Set			0	0
122	Appropriate arrangement is to be there for engine room ventilation (considering ambient condition). Requirement of supply blowers needs to be ascertained by the bidder as per the aspiration need of proposed engines and to be provided. Exhaust blowers of adequate capacity are also to be fitted in convenient place in each engine room. Number of supply and exhaust blower with size and capacity are to be specified.	2	Nos.			0	0
123	Ventilation of galley, sanitary and magazine Rooms	8	Nos.			0	0
124	The Domestic and Deep Fridge should have sufficient capacity to refrigerate fresh provision of at least 5 days. The fridge is to be compatible with ship's electrical supply. In addition, the refrigerators should be operable to run with shore supply voltage. Detailed specification and total quantity of the refrigerators is to be submitted within the quotation. Country of origin and manufacturer UK, EU countries, USA, Japan.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
125	Different types of piping System:	1	Lot			0	0
126	Ballast System (If required)	1	Lot			0	0
127	Bilge System	1	Lot			0	0
128	Fuel Oil System	1	Lot			0	0
129	Freshwater Cooling System	1	Lot			0	0
130	Domestic Freshwater System (Drinking and Hot Water)	1	Lot			0	0
131	Seawater Cooling System	1	Lot			0	0
132	Fire Main System	1	Lot			0	0
133	Domestic Seawater System	1	Lot			0	0
134	Bilge System	1	Lot			0	0
135	Sprinkler System	1	Lot			0	0
136	Scuppers and Drains	1	Lot			0	0
137	Hydraulic System	1	Lot			0	0
138	Compressed Air system	1	Lot			0	0
139	Exhaust Gas System	1	Lot			0	0
140	Air Vent System	1	Lot			0	0
141	Heat exchangers of adequate capacity suitable for tropical environment are to be installed with each main engine, diesel generators and Emergency diesel generator. The heat exchangers should have sea water supply from the sea chests. Provisions of opening the chests for inspection are to be made. Detailed information about the type of Cooler is to be provided.	1	Lot			0	0
142	Air and Exhaust Arrangement: The turbo-chargers are to obtain air suction via air filters from the well-ventilated engine room. Exhaust gases from main engines, diesel	2	Sets			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	generators and Emergency diesel generator are to be led to the atmosphere via a dry type exhaust silencer to ships side/through funnel at upper deck. Expansion pieces are to be arranged for exhaust systems where necessary. The exhaust system is to be insulated with appropriate thickness of mineral wool with galvanized steel with suitable portable arrangement in way of flanges and expansion pieces. Drain outlets are to be arranged at silencers. Suitable thermometers/ pyrometers are to be fitted into the air inlet and exhaust lines. An exhaust flap is to be fitted with each exhaust pipe. Each main diesel engine, diesel generator and Emergency diesel generator will be fitted with separate exhaust flap. Engine room temperature shall not exceed 10 degrees centigrade more than the ambient temp. Adequate ventilation to be provided considering Bangladesh high ambient temp and humid weather.						
143	The fuel and lub 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 fresh water sounding pipes are to be located in the accommodation compartments.	1	Set			0	0
144	A set of portable Pollution control equipment with necessary accessories and arrangement considering sea condition of Bangladesh coastal area is to be provided (Floating boom, skimmer, skimmer suction pump etc.) to fight pollution (like oil spillage etc.).	1	Set			0	0
145	**Protection against Marine Pollution:** The RPVs will have IMO, MARPOL approved means for disposal of	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	garbage, oily water and other wastes complying class approval.						
146	POL and Chemicals: As per article 547 of Section 7	1	Lot			0	0
147	Emergency Power Distribution with emergency switchboard. Class approval certificate/ drawing should be provided	1	Lot			0	0
148	Conversion Machinery as per article 610 and 616 of Section 7	1	Lot			0	0
149	Shore Supply Arrangement as per article 611 and 617 of Section 7	180	Meters			0	0
150	Class approved Battery Switch board	1	No.			0	0
151	Batteries with sufficient capacity as per article 612(b) and 618 of Section 7	10	Nos.			0	0
152	Main generator as per article 613 of Section 7. Class certificate should be provided.	2	Nos.			0	0
153	Emergency Generator Set as per article 614 of Section 7. Product certificate should be provided.	1	No.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
154	Main Switchboard: One main switch board will be fitted with all modern switchgear and centralized load management system. It should have provisions for auto/ manual start-stop, auto parallel and auto load sharing of generators. The switchboard is to be of marine type, floor mounted. Switchboard and internal components shall be 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. All other specification as per article 615 of Section 7. Class certificate should be provided.	1	No.			0	0
155	General Lighting	1	Lot			0	0
156	Interior Lights	1	Lot			0	0
157	All electrical fittings in the magazine are to be of an intrinsically safe type and to be of watertight to protect it from water spray. Special fireproof shielded cables and explosion proof lights and fittings are to be fitted inside the magazine. All cables in the magazine must be encased in metal conduit. Switches are to be mounted outside access to the magazine. Magazine lighting switches are to be painted red.	1	Lot			0	0
158	Exterior Lighting as required	1	Lot			0	0
159	Emergency Lighting - Automatic Emergency Lanterns	1	Lot			0	0
160	Navigation Lights complying COLREG requirements and specification as per tender	9	Nos.			0	0
161	Signal Lights	1	No.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
162	portable LED floodlights (each 300W) are to be provided	3	Nos.			0	0
163	Fixed flood lights of appropriate capacity watt for boat area and two appropriate capacity sealed beam type (24 V DC) boat lowering light.	2	Nos.			0	0
164	Appropriate capacity floodlights are to be installed in front of Bridge to illuminate fox"l area and two at the aft side of the ship to illuminate aft area of the ship.	2	Nos.			0	0
165	500W LED signal search lights swivel mounting type are to be provided at a suitable location. These should be remotely controlled from bridges.	2	Nos.			0	0
166	100W watertight type with 15 m cord and plug	4	Nos.			0	0
167	100W non-watertight type with protection guard, 15 m cord and plug	6	Nos.			0	0
168	60W working light with one side cover, 15m cord and plug	10	Nos.			0	0
169	Appropriate number of spotlights with red lens and dimmer are to be provided for spot illumination of ops room equipment, displays, repeaters, Captain’s chair at bridge and ops room etc.	1	Set			0	0
170	Red lighting (220V, AC, 20W fluorescent) is to be fitted in the spaces when there is exposure of light to the outside due to movement of personnel onboard RPV. Intensity of the light is to be such that minimum of illumination is to be maintained for the movement of the personnel.	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
171	Darken ship facilities whereby no internal lighting is to be visible externally even when doors and hatches are opened are to be incorporated in the ship's installation. This facility shall be controlled by a number of darkened switch boxes and door limit switches in suitable positions. A single switch to interrupt supply of all non-essential external lighting in darkened ship's state shall be conveniently located on the bridge.	1	Set			0	0
172	Watertight ceremonial dressing lighting circuits of required length are to be provided to illuminate ship's side, super structure and fore to aft over the mast. The required number of watertight power receptacles with switch is to be provided on the main deck and superstructure to provide electric power to the dressing light.	1	Set			0	0
173	Fire Detection System approved by class.	1	Set			0	0
174	General Alarm System approved by class.	1	Set			0	0
175	Cables of different sizes as per class approval	7000	Meters			0	0
176	**Gyro Compass.** One in number Gyro Compass is to be supplied from an internationally reputed company of (Sperry Marine/ SAGEM/GEM Electronica/Arma Brown/ ANSYS). The proposed gyro (INS/Fiber Optic technology) should provide extremely precise rotational rate information and quick settling time. All other specifications are as per article 702 of Section 7.	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
177	**Magnetic Compass.** Each RPV is to be fitted with a one magnetic compass and located on the bridge/bridge top. There should be at least two repeaters at a suitable location. A telescope mirror is also to be fitted in the bridge position. COO & manufacture: USA/UK/EU/ Japan	1	Set			0	0
178	**Speed Log.** Each RPV is to be fitted with one electromagnetic log. The master speed unit is to be installed in the bridge. The log is to be fitted with at least 03 repeaters. It should have the facility to interface with the Radars, Gyro and as required. Dual axis Doppler Speed log may be installed. COO & manufacture: USA/UK/EU/ Japan	1	No.			0	0
179	**Horns / Sirens.** Each RPV is to be provided with air whistles for navigational purpose to produce a clear, sharp tone of unvarying intensity under all weather conditions regardless of time between blasts as per COLREGs 1972 and appropriate control device for producing desired sound signals to be incorporated. COO & manufacture: USA/UK/EU/ Japan	1	No.			0	0
180	**Echo Sounder.** The ship is to be fitted with two proven types of Echo sounder with transducer consisting of a digital indicator and echo-graphic display. The maximum measuring depth of the echo sounder is up to 800 meters. The transducer is to be of hull flush mounting type and is to be installed at an appropriate place at the bottom of the hull. All other specifications are as per article 706 of Section 7. COO & manufacture: USA/UK/EU/ Japan	2	Nos.			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
181	**Navigational Radar.** Two X/S-Band navigational radars with integrated Electronic Chart Display and Information System (ECDIS) must be provided for the each RPV to be installed in Bridge and interfaced with gyrocompass, AIS, GPS, speed log etc. One radar each will have one color tactical display at bridge. It should be by IMO or mil Std. These Radars should be from an internationally reputed company and latest version (Model: Kelvin Hughes/Thales/Leonardo/Furuno).	2	Nos.			0	0
182	**GPS.** Two in number GPS of an internationally reputed company are to be installed for continuous position and time reference data. The antenna is to be installed in a suitable location and the main unit is to be installed on the bridge. One remote indicator each is to be installed in the bridge and in the Commanding Officer's Cabin. The equipment must be interfaced with the required weapons and sensors on board ship. Country of origin and manufactured from Western country (To be mentioned). COO & manufacture: USA/UK/EU/ Japan	2	Nos.			0	0
183	**AIS.** One in No AIS must be installed (NEMA standard) in each RPV which needs to be interfaced with Ship's Radar. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
184	**Barometer.** One Aneroid Barometer is to be provided and mounted in the bridge. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
185	**Barograph.** One barograph is to be provided and fitted in the Commanding Officer's Cabin. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
186	**Anemometer.** Each RPV is to be fitted with an Anemometer, which will indicate the relative wind speed and direction. The wind transmitter will be located on the mast and the remote indicators in the ops room and bridge. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
187	Hygrometer. COO & MANUFACTURE: USA/UK/EU/ Japan	1	No			0	0
188	EO-IR surveillance system. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
189	Tx/Rx HF (Military Communication) - 100-150W. COO & manufacture: USA/UK/EU/ Japan	2	Nos			0	0
190	Tx/Rx VHF/ UHF - (Narrow Band). COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
191	Tx/Rx VHF/ UHF - (Wide Band). COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
192	Tx/Rx VHF - Air Band. COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
193	Tx/Rx VHF (Walkie Talkie). COO & manufacture: USA/UK/EU/ Japan	6	Nos			0	0
194	Satellite Telephone (Handheld). COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
195	Long-Range Identification and Tracking (LRIT). COO & manufacture: USA/UK/EU/ Japan	1	No			0	0
196	Marine Loud Hailer System (Range at least 2000m)	1	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
197	**Distress and Safety Communication Equipment.** The distress and safety communication system will include the following: a. Standard Global Maritime Distress and Safety System (GMDSS) equipment including Emergency Positioning Indicating Radio Beacon (EPIRB) and Search and Rescue Transponder (SART). b. Any other radio equipment as per SOLAS or equivalent standard.	1	Lot			0	0
198	**Antenna.** All radio equipment is to be installed with the associated antenna. Appropriate radiation signs and warnings are to be placed or marked near the antenna for hazard warning purposes. Antenna location should ensure minimum mutual interference and Electromagnetic compatibility (EMC).	1	Lot			0	0
199	**Internal Telephone System.** Warship Standard Intercom covering all office, accommodation and equipment/ machinery spaces will be provided. All other specifications are as per Section 804 a. COO & MANUFACTURE: USA/UK/EU/ Japan	1	Set			0	0
200	**Voice Pipes.** Internal voice pipes from bridge to CO's cabin and ECR/ MCR are to be fitted.	1	Lot			0	0
201	**Internet Connection.** Under-mentioned facilities are to be provided for creating a secured internet facility inside the ship:(1) Marine grade robust router with latest encryption standards with appropriate steel made waterproof rack. Details to be mentioned.(2) Access Points to cover the whole ship. Details to be mentioned.(3) Cable terminated on patch panel(4) Cable	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	terminated on wall sockets in the following spaces:(a) Two in the bridge(b) Two in every office(c) Two in the wardroom(d) Two in each cabin(e) All other compartments/ spaces as necessary(5) A network infrastructure based on Cat 6 SFTP cable with:(a) Network Quality 10000 Mbps(b) Patch panel and wall sockets are foreseen with RJ45 sockets(c) Cable terminated on patch panel						
202	**General Broadcast.** The General Broadcast (SRE) of appropriate output power is to be provided for reliable broadcasts of alarms, announcements and entertainment programs. The main unit is to consist of a number of identical amplifiers as required with one spare amplifier, radio tuner including alarm and announcement initiation abilities as well as speakers spread over the RPV. IP-based broadcast systems with network components may be installed. All other specifications are as per article 805 of Section 7. COO & MANUFACTURE: USA/UK/EU/ Japan	1	Lot			0	0
203	**Central TV Receiving System.** A central TV receiving system is to be provided for various TVs of the ship. A shore connection point is to be provided for connecting shore Cable TV to the ship's recreation system.	1	Lot			0	0
204	**CCTV.** Only 01 camera at Foxl and 01 camera at Quarterdeck with Night Vision high-resolution capability for covering upper deck. CCTV surveillance with at least 15 days of video storage facility. Additional display units/TVs are to be supplied for monitoring the CCTV footages. To be mentioned.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
205	**Signaling Projectors.** Two in number (Marine Military Version) signaling projectors (500W, size not less than 10 inches) are to be provided and installed at a suitable location.	2	Nos			0	0
206	**Signaling Flag.** Two sets of dressing lines (complete with dressing flags) and two sets of signal flags (Naval Standard) are to be supplied. A suitable locker is to be made for storing the flags.	1	Lot			0	0
207	**Flashing Light.** Two in number flash signaling lights (Omni Directional) with necessary accessories will be provided and installed at suitable location in the main mast (yardarm).	2	Set			0	0
208	**Emergency Arrangements.** a. Alternate power supplies to all communication equipment must be provided. b. Emergency power supplies to all communication equipment as required.	1	Lot			0	0
209	**Documents.** The following documents are to be provided for the above-mentioned equipment in this section: a. All basic and production drawings, circuit diagrams and fault-finding diagrams. b. System-wise equipment operation and maintenance manuals and drawings including parts identification list (PIL). c. Other documents as necessary.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
210	**30 mm Gun.** The main gun of the RPV will be a 30 mm new generation lightweight rapid-fire gun for anti-surface and anti-air firing. It is to be fitted in the forward part of the ship. The gun is to be provided with the necessary power supply. All other specifications are as per article 902, 903, 904, 905, 906 of Section 7.	1	No			0	0
211	**12.7 mm Gun.** 2 x 12.7 mm gun for each ship. Necessary installation facilities (Pintle) to be made for the gun. 01xGun (12.7mm) may be installed onboard and 01xGun (12.7mm) may remain as depot stock. However, if design permits both guns may be installed onboard. All other specifications are as per article 907, 908 of Section 7.	2	Nos			0	0
212	**Illuminating Flare and Pyrotechnics.** Required quantity of flare and pyrotechnics are to be supplied and a suitable locker for storing them is to be made in each RPV with flooding arrangement from fire main system. To be mentioned.	1	Lot			0	0
213	**Small Arms.** Under-mentioned small arms with their ammunition and accessories including web equipment are to be supplied onboard each RPV:a. 6 x Pistols 9mm (BERETTA 92FS)b. 2 x Signal Pistols	1	Lot			0	0
214	Pistol Cupboard and Armory for Small Arms. Pistol Cupboard is to be made in the Commanding Officer's cabin for the storing facility of pistols and an armory is to be made for the under-mentioned small arms and all respective ammunition in each RPV: a. 10 x SMGs b. 10 x Rifle c. 2 x Signal Pistol d. 3 x LMGs	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
215	**Magazine.** Suitable magazine for stowage of ammunition for guns. The magazine should have a stowage capacity of approximately 2500 rounds of ammunition for the 30mm gun and approximately 2500 rounds of ammunition for 12.7mm guns. The magazine is to be constructed as watertight compartments with air conditioning facilities. All other specifications are as per article-912 of Section 7.	1	Lot			0	0
216	**RU Locker for 30 mm Gun.** a. RU locker will be in the close vicinity of the gun. **a.** RU locker will have capacity to store sufficient number of rounds of ammunition for 30 mm guns (To be mentioned). **b.** Dual locking arrangements will be provided on door. **c.** Fire retarding paint will be used in RU lockers. **d.** RU lockers are to be placed in such a way so that they do not receive direct sunlight as a preventive measure against overheating. **e.** RU lockers should be according to class rule.	1	Lot			0	0
217	**RU Lockers for 12.7 mm Gun.** a. RU lockers should be in the close vicinity of the guns.STD RPV-BCG(PW-7A) 196b. RU lockers should have capacity to store approximately 200 rounds of ammunition for 12.7 mm guns.c. Dual locking arrangements are to be provided on doors.d. Fire retarding paint is to be used in RU lockers.e. RU lockers are to be placed in such a way so that they do not receive direct sunlight as a preventive measure against overheating.f. RU lockers should be according to class rule.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
218	**Ammunition Handling.** Necessary means are to be provided so that the ammunition can be loaded aboard, struck down and removed in the most efficient manner considering the safety and speed of handling.	1	Lot			0	0
219	**Bulletproof Helmets, Bulletproof Jackets, Web Equipment and Anti Flash Hoods.** Bulletproof helmets, bulletproof jackets and anti-flash hoods are to be provided for 12 (twelve) personnel for each RPV. Web equipment is to be provided as required. To be mentioned.	1	Lot			0	0
220	**Supply of Ammunition and Documents for Gun.** Local Shipbuilder/Tenderer is to supply the required number of ammunitions for conducting Proof firing of Guns in Bangladesh. In addition, 500 rds ammo for each 30mm gun (total-2500 rds for 5xRPVs) and 500 rds ammo for 12.7mm gun (Total 2500 rds for 5xRPVs) has to be provided. Besides following documents, need to be supplied. Price to be quoted separately for supply of ammunition and maintenance training of guns (Details to be mentioned). Details are as follows: a. Required number of ammunitions to be supplied for proof/test firing for each RPV each gun.b. Operation and maintenance training for 30mm and 12.7mm Gun.c. OEM recommended fast moving spare parts for 5 years of smooth operation of the guns.d. Manual of supplied guns.e. Parts catalogue and colored PIL.	1	Lot			0	0
221	**Accommodation.** All specifications are as per article 1001 a of Section 7.	1	Lot			0	0
222	**Utility Compartments.** All specifications are as per article 1001 b of Section 7.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
223	**Working Compartments and Rooms.** All specifications are as per Section 1001 c of Section 7.	1	Lot			0	0
224	**Stores and Lockers.** All specifications are as per Section 1001 d of Section 7.	1	Lot			0	0
225	**Tanks.** Tanks for fuel oil, lub oil, fresh water, dirty lub oil, foam, etc. are to be provided as necessary. Most of the tanks are to be constructed as integral part of the hull. The tanks are to be fitted with filling and discharge lines and valves, gauges, vents, etc. The fuel oil capacity should be such that RPVs can run at least an endurance of 1500 nm at cruising/economical speed. The fresh water tank capacity is to be approximately 10 tons.	1	Lot			0	0
226	**Stores.** Store capacity is to commensurate with the requirements of complement and endurance. The stores are to be fitted with shelves, racks, bins and other facilities as required. Adequate on board fast moving & ready use spares' storing capacity is to be available. The dry provisions, fresh provisions capacity should be for 15 days and 5 days respectively. The capacity of stores to be mentioned.	1	Lot			0	0
227	**Key Boards.** One in number armament key board with key hooks and identification tags will be fitted in Captain's cabin. A general key board will be fitted in the wardroom. One in number radiation hazard key board is to be fitted in suitable place.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
228	**Diving Store.** Air-conditioned stowage and charging facilities are to be provided for 8 in number diving sets (As mentioned under article 441 of Section 7) with necessary gears and a portable diesel air compressor suitable to supply diving air is to be placed in a suitable location. The diving store should have provision for charging the diving sets with safe compressed air supplied from compressor. Diving sets are to be supplied by shipbuilder. One Breathing Air Compressor is to be provided with each RPV.	1	Lot			0	0
229	**Flag Lockers.** Two in number flag lockers of suitable size with 70 pigeon holes to be fabricated and fitted on the upper deck near to the mast.	2	Nos			0	0
230	**Miscellaneous.** All specifications are as per article 1007 of Section 7	1	Lot			0	0
231	**Furniture.** Furniture and facilities of accommodation, living spaces and working places are to be adequate for number of personnel and of good marine quality and should be supplied under material package from foreign shipbuilder. Materials of furniture are to be of good quality, fire retardant. Metallic furniture may also be used as required. All specifications are as per article 1008, 1009 of Section 7.	1	Lot			0	0
232	**Furniture for Exposed Deck and Other Spaces.** Following furniture are to be provided on exposed deck: a. 2 x Aluminum life jacket boxes. b. 2 x Wooden thermometer box. c. 4 x First aid boxes. d. 2 x Stretchers with securing arrangement e. 6 x revolving chairs.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	f. Shelves, cupboards etc. for galley. g. Shelves, cupboards etc. for wardroom pantry						
233	**Fittings of Sanitary Space.** All exposed metal fixtures, taps, valves, accessories etc. are to be of chromium coated brass. Rubber washers are to be fitted between all China plumbing fixtures and metal supports.a. Wash Basin. Stainless steel wash basins with spring loaded tap, S-trap and rubber ring are to be provided.b. Water Closet. The water closets are to be of pedestal type for all officers and crews. Sea water flush and one fresh water tap are to be provided.c. Shower. The showers are to be of swivel shoe head type.d. Toilet Cabinet. The material of the toilet cabinet is to be of molded plastic with shelf inside and mirror on the hinged door. Mirror lamp is to be fitted over toilet cabinet.e. Others. Wall mounted lavatory rack and mirror with the wash basins, soap holder, towel rack, hooks, toilet paper holder, sea water tape, etc. are to be provided as necessary.	1	Lot			0	0
234	**Galley.** The galley should have facility to Cook food for minimum 35 persons. Adequate supply and exhaust blowers are to be fitted to have good ventilation. All the galley fittings and equipment shall be made of stainless steel. All specifications are as per article 1012 of Section 7.	1	Lot			0	0
235	**Ward Room Pantry.** All specifications are as per article 1013 of Section 7.	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
236	**<u>Mess Traps, Mess Utensils and Galley Implements.</u>** Mess Traps, mess utensils and galley implement will be supplied for Wardroom, Senior Rates' mess, Junior Rates' mess and ship's galley as per existing authorization for the ship's complements at the time of first outfit (for this BCG standard have to be followed). The Shipbuilder/Tenderer should provide the following items (for officers and for crews) 1 (one) Set in full per RPV as per approved design by the BCG with the delivery of the RPVs:	1	Lot			0	0
237	Block Wood for Chopping	1	No			0	0
238	Board Paste Wooden	1	No			0	0
239	Bowl Salad	2	No			0	0
240	Bowl Finger	5	No			0	0
241	Box Ice with Ice tong	1	No			0	0
242	Boxes Cash	1	No			0	0
243	Brush Crumb	1	No			0	0
244	Bucket Pantry Plastic	1	No			0	0
245	Blender Electric	1	No			0	0
246	Canister sugar/Tea	2	No			0	0
247	Chopper Meat	1	No			0	0
248	Cloth table D D white	5	No			0	0
249	Colanders Aluminum	1	No			0	0
250	Cruet Set Complete	1	No			0	0
251	Chafing Dish Oblong	1	No			0	0
252	Chafing Dish Double	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
253	Coffee Maker Electric	1	No			0	0
254	Cooking Spud Small	3	No			0	0
255	Cooking Spud Medium	2	No			0	0
256	Cooking Spud Large	2	No			0	0
257	Cup Shrimp Cocktail	10	No			0	0
258	Cup Ice Cream	10	No			0	0
259	Cup Tea	10	No			0	0
260	Cup Egg	5	No			0	0
261	Cup Coffee	12	No			0	0
262	Candle Stand	2	No			0	0
263	Decanter	1	No			0	0
264	Dish Butter	1	No			0	0
265	Dish Flat 30 -31cm	2	No			0	0
266	Dish Flat 35 -36cm	2	No			0	0
267	Dish Flat 40 -41cm	1	No			0	0
268	Dish Pie Aluminum	1	No			0	0
269	Dish Vegetable with Cover	2	No			0	0
270	Dish Curry	2	No			0	0
271	Duster Blue Check	12	No			0	0
272	Fork Carving	10	No			0	0
273	Fork Serving	5	No			0	0
274	Fork Dessert	10	No			0	0
275	Fork Fruit	10	No			0	0
276	Fork Table	10	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
277	Fork Fish eating	10	No			0	0
278	Fork Pickle	1	No			0	0
279	Frill Cloth Navy Blue/White	100	Meter			0	0
280	Goblet	10	No			0	0
281	Hand Gloves Cotton White	4	Pairs			0	0
282	Ice Cream Scooper	1	No			0	0
283	Jar Pickle Glass with cover	1	No			0	0
284	Jug Aluminum	1	No			0	0
285	Jug Water Glass	1	No			0	0
286	Juice Maker	1	No			0	0
287	Kettle Electric	1	No			0	0
288	Kettle Tea Aluminum	1	No			0	0
289	Knife Butter	1	No			0	0
290	Knife Butter Spreading	5	No			0	0
291	Knife fish Eating	10	No			0	0
292	Knife fruit	10	No			0	0
293	Knife Dessert	10	No			0	0
294	Knife Carving	10	No			0	0
295	Knife Table	10	No			0	0
296	Knife Bread	1	No			0	0
297	Knife Cook	2	No			0	0
298	Ladle Cook Wooden	1	No			0	0
299	Ladle Aluminum	1	No			0	0
300	Machine Mincing	1	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
301	Machine Potato Chipping	1	No			0	0
302	Machine Potato Pinching	1	No			0	0
303	Menu Stand with BCG Crest	2	No			0	0
304	Napkin Table	10	No			0	0
305	Number Stand with Plastic Numerical	5	No			0	0
306	Opener Bottle/Tin	2	No			0	0
307	Oven Electronics/Electric	1	No			0	0
308	Pan Frying	2	No			0	0
309	Plate breakfast	12	No			0	0
310	Plate Dessert	12	No			0	0
311	Plate Dinner	12	No			0	0
312	Plate Pudding	12	No			0	0
313	Plate Soup	12	No			0	0
314	Plate Quarter	12	No			0	0
315	Pot Cooking 15 cm X 13cm with cover	2	No			0	0
316	Pot Cooking 25 cm X 12cm with cover	2	No			0	0
317	Pot Cooking 28 cm X 18cm with cover	2	No			0	0
318	Pot Cooking 35 cm X 17cm with cover	2	No			0	0
319	Pot Cooking 45 cm X 23cm with cover	1	No			0	0
320	Pot Cooking 66 cm X 46cm with cover	1	No			0	0
321	Pot Cooking 76 cm X 63cm with cover	1	No			0	0
322	Pot Sugar	2	No			0	0
323	Pot Milk	2	No			0	0
324	Pot Tea	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
325	Pot Coffee	2	No			0	0
326	Potato Masher	1	No			0	0
327	Pestle and Mortar	1	No			0	0
328	Pressure Cooking	1	No			0	0
329	Sandwich Maker	1	No			0	0
330	Saucer Coffee	12	No			0	0
331	Saucer Tea	10	No			0	0
332	Sieves wire	1	No			0	0
333	Slicer Egg	1	No			0	0
334	Spoon coffee	10	No			0	0
335	Spoon Ice Cream	10	No			0	0
336	Spoon Tea	10	No			0	0
337	Spoon Soup	12	No			0	0
338	Spoon Serving	5	No			0	0
339	Spoon Iron/S S Small	2	No			0	0
340	Spoon Table	10	No			0	0
341	Spoon Dessert	10	No			0	0
342	Spoon Rice Serving	2	No			0	0
343	Sauce Boat	1	No			0	0
344	Sherry Glass (Toasting)	10	No			0	0
345	Stone Curry with roller	1	No			0	0
346	Strainer Gravy Conical	1	No			0	0
347	Tawa Iron	1	No			0	0
348	Tin Flour/ Atta/Rice with cover	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
349	Toaster Rack& partition	1	No			0	0
350	Toaster Electric	1	No			0	0
351	Tumbler Table	12	No			0	0
352	Tray Serving Oblong	1	No			0	0
353	Tub Washing	1	No			0	0
354	Waiter Round 25 cm	1	No			0	0
355	Whisks Egg	1	No			0	0
356	Weighing Machine Spring/Dial 0-50 kg	1	No			0	0
357	Scale of mess utensils and galley implements for ship's company mess- RPV						
358	Air Pot 4 Ltr	1	No			0	0
359	Block wood for chopping	1	No			0	0
360	Bucket pantry, Aluminum						
	a. 10-12	1	No			0	0
	b. 15-20	2	No			0	0
361	Chopper Meat						
	a. 30 cm	2	No			0	0
	b. 25 cm	1	No			0	0
	c. 20 cm	2	No			0	0
362	Cloth Table	10	Meter			0	0
363	Colanders Aluminum	1	No			0	0
364	Cooking Spud						
	a. 91 cm	2	No			0	0
	b. 111 cm	1	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	c. 137 cm	2	No			0	0
	d. 152 cm	2	No			0	0
365	Cup Tea	40	No			0	0
366	Dish Rice SS, 10 Men Serving	4	No			0	0
367	Dish Vegetables SS, 10 Men Serving	2	No			0	0
368	Dish Dall SS, 10 Men Serving	4	No			0	0
369	Dish Curry SS, 10 Men Serving	2	No			0	0
370	Drum Sugar SS with Cover						
	a. 25 kg	1	No			0	0
	b. 50 kg	2	No			0	0
371	Drum Tea SS with Cover						
	a. 25 kg	1	No			0	0
	b. 50 kg	2	No			0	0
372	Drum Salt SS with Cover						
	a. 25 kg	2	No			0	0
	b. 50 kg	2	No			0	0
373	Drum Dall SS with Cover						
	a. 25 kg	1	No			0	0
	b. 50 kg	2	No			0	0
374	Drum Milk powder SS with Cover						
	a. 25 kg	1	No			0	0
	b. 50 kg	2	No			0	0
375	Jug						
	a. Aluminum, 2 Ltr	1	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	b. SS, 2 Ltr	2	No			0	0
376	Kettle Tea, SS 4 ltr	1	No			0	0
377	Knife Cook SS						
	a. 15 cm	1	No			0	0
	b. 30 cm	2	No			0	0
	c. 35 cm	1	No			0	0
	d. 40 cm	1	No			0	0
	e. 45 cm	1	No			0	0
378	Ladle Cook Brass						
	a. 30 cm	2	No			0	0
	b. 45 cm	2	No			0	0
	c. 76 cm	1	No			0	0
	d. 91 cm	1	No			0	0
	e. 121 cm	1	No			0	0
379	Meat Mincing Machine						
	a. Light Duty	1	No			0	0
	b. Heavy Duty	1	No			0	0
380	Mixture Machine	1	No			0	0
	a. Light Duty	1	No			0	0
	b. Heavy Duty	2	No			0	0
381	Pan Frying						
	a. 40 cm (Diameter)	2	No			0	0
	b. 45 cm (Diameter)	2	No			0	0
	c. 76 cm (Diameter)	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
382	Piston and Mortar	1	No			0	0
383	Pot Cook With Cover						
384	a. 15cmX13cm	2	No			0	0
	b. 25cmX12cm	3	No			0	0
	c. 25cmX18cm	3	No			0	0
	d. 35cmX17cm	4	No			0	0
	e. 45cmX23cm	3	No			0	0
	f. 51cmX33cm	3	No			0	0
	g. 65cmX37cm	2	No			0	0
	h. 66cmX46cm	2	No			0	0
385	Saucer Tea	40	No			0	0
386	Slicer						
	a. Light Duty	1	No			0	0
	b. Heavy Duty	2	No			0	0
387	Spoon Serving SS						
	a. Rice	4	No			0	0
	b. Vegetable	2	No			0	0
	c. Dal	4	No			0	0
	d. Curry	2	No			0	0
388	Spoon Tea SS	40	No			0	0
389	Strainer	2	No			0	0
390	Tawa, Iron						
	a. 15 cm	2	No			0	0
	b. 40 cm	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
	c. 60 cm	2	No			0	0
	d. 82 cm	2	No			0	0
391	Water Glass Drinking SS	40	No			0	0
392	Weighting Machine Spring/Dial					0	0
	a. 0-50 kg	1	No			0	0
	b. 0-100 kg	2	No			0	0
393	**Ship's Office and Office Equipment.** To meet the ship's administrative functions, ships office is to be equipped with the followings:						
394	Cabinets and shelves for correspondence files and publications stowage.	1	Lot			0	0
395	Combination safe of suitable size.	1	No			0	0
396	All-in-one computers (with UPS and all accessories)	4	No			0	0
	Laptop	3	No			0	0
	Printers	3	No			0	0
	Scanner	2	No			0	0
	Photocopier machine (Heavy Duty)	2	No			0	0
	Local Area Network (LAN) facility is to be provided	1	Set			0	0
397	One desk with desk light, one file cabinet, two chairs with arm, two chairs without arms, etc.	1	Lot			0	0
398	**Laundry Space.** The laundry space shall be provided with:		No			0	0
399	Washing machines (each 15kg capacity) with dryer facility to be provided.	2	No			0	0
400	**Sick Bay.** The sick bay shall be provided with:		No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
401	Bunk with mattress and the lower bunk with drawers.	1	No			0	0
402	Lockers for medicines.	2	No			0	0
403	Small refrigerator.	1	No			0	0
404	Medical waste disposer.	2	No			0	0
405	Oxygen cylinder and concentrator arrangement	1	No			0	0
406	X-Ray report check board	1	No			0	0
407	Fast aid box	1	No			0	0
408	BP check machine	1	No			0	0
409	Stethoscope	1	No			0	0
410	Nebulizer set up	1	No			0	0
411	Any other necessary item to be provided (To be mentioned)	1	Lot			0	0
412	**Damage Control Stations.** All specifications are as per Section- 1018	1	Lot			0	0
413	A package of OEM recommended spare parts (with item wise price) for five years operation of main engines	1	Lot			0	0
	A package of OEM recommended spare parts (with item wise price) for five years operation of gearboxes	1	Lot			0	0
	A package of OEM recommended spare parts (with item wise price) for five years operation of generator sets	1	Lot			0	0
	Spare parts for steering system	1	Lot			0	0
	Spare parts for auxiliary machinery	1	Lot			0	0
	A package of OEM recommended spare parts (with item wise price) for five years operation of air conditioning plants	1	Lot			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
414	Spare parts for all electrical and electronic equipment	1	Lot			0	0
415	Spare parts for all sensors and armaments	1	Lot			0	0
416	Spare parts for propulsion and power generation control and monitoring system.	1	Lot			0	0
417	Spare parts for all deck machinery.	1	Lot			0	0
418	Spare parts for general systems and shafting.	1	Lot			0	0
419	Any other spare parts deemed necessary by the Local Shipbuilder/Tenderer.	1	Lot			0	0
420	**Special Tools.** Following special tools are to be supplied with each RPV of 5 (five) RPVs. List should include following test equipment but not limited to:					0	0
421	Propeller nut spanner.	1	No			0	0
422	Propeller pulling device.	1	Set			0	0
423	Grease guns with nipple.	3	No			0	0
424	Tool boxes with standard tools.	3	No			0	0
425	Socket spanners (Range to be mentioned).	2	Set			0	0
426	Ring spanners (Range to be mentioned).	2	Set			0	0
427	Open-end spanners (Range to be mentioned).	2	Set			0	0
428	L-end key (Range to be mentioned).	2	Set			0	0
429	Files (Range to be mentioned).	3	Set			0	0
430	Vernier calipers (Range to be mentioned).	2	No			0	0
431	Micrometers (Range to be mentioned).	2	No			0	0
432	Adjustable spanners (Range to be mentioned).	3	Set			0	0
433	Carpentry tool boxes with standard tools (Details of tools are to be mentioned).	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
434	Bearing extractors (Standard size).	2	No			0	0
435	Chain block (2 tons capacity).	2	No			0	0
436	Chain block (3 tons capacity).	2	No			0	0
437	Torque spanner (Range to be mentioned).	1	No			0	0
438	Punch set (Range to be mentioned).	2	No			0	0
439	Tool Kit Set (Brief Case of all necessary tools for electrical system).	2	No			0	0
440	Safety Harness for working in radio-electrical system fitted in the mast.	2	No			0	0
441	Portable Hot Blower.	1	No			0	0
442	Portable Hand Blower.	1	No			0	0
443	Supplementary tools such as workbench, hoisting gear and deck tools. (List of items in the set of supplementary tools is to be mentioned.)	1	Set			0	0
444	Lub oil and Cooling water test kit.	1	No			0	0
445	Crimping tool set.	1	No			0	0
446	Tools for electrical works	1	Box			0	0
447	Marine type lead lamp with extension line (for engine and machinery space)	2	No			0	0
448	**Test Equipment.** Following test equipment for each RPV of 5(five) RPV's are to be provided by the Shipbuilder/Tenderer. List should include following test equipment but not limited to:						
449	Digital Multi meter	2	No			0	0
450	Weber tester.	2	No			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
451	Clamp tester	2	No			0	0
452	Megger.	2	No			0	0
453	Digital tachometer.	2	No			0	0
454	Hydrometer.	2	No			0	0
455	AC gas pressure tester.	2	No			0	0
456	Rechargeable infrared temperature measuring equipment (temperature measuring range 10°C to 1200°C).	2	No			0	0
457	Drawings and documents for the construction of hull, outfitting, accommodation, structural and others as required to build the vessel	3	Sets			0	0
	Installation Manual for the equipment	3	Sets			0	0
	Maintenance Manual for the equipment	3	Sets			0	0
	Installation and Maintenance manual for Navigation and communication equipment	3	Sets			0	0
	Workshop level maintenance manual as per article 1105(a) of Section 7.	3	Sets			0	0
458	Parts Catalogue as per article 1106 of Section 7.	3	Sets			0	0
459	The inclining experiment is to be carried out upon the substantial completion of RPV but before the sea trial and results are to be recorded for the calculation of the vessel's trim, stability, light weight and dead weight.	1	Set			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
460	FAT/ PSI: All machinery, equipment and items are to be factory tested. To this effect, copies of FAT/PSI certificates are to be provided. Provisions are to be kept so that 4 x BCG representatives for each group can attend FAT/PSI for main engines, generators, Guns and 3 x BCG representatives for Radar at the manufacturer's premises or manufacturer's authorized premises in the same country. Shipbuilder/Tenderer will bear all expenses regarding international travel, accommodation and meals for the FAT of BCG team. All expenses related to internal travel within the manufacturer's country, reception and arrangement for entry into the country/concerned area for FAT/PSI will be borne by the Tenderer/shipbuilder. Foreign shipbuilders/foreign design package suppliers should arrange a visit for purchasing representatives to design package material supplier's premises before signing the contract (One time visit for 5 Nos. RPV's).	5	Nos			0	0
461	Performance test of all machinery and equipment are to be carried out with BCG personnel on board. During on-board test, all machinery, equipment and all piping and wiring systems supplied and/or installed on board will be tested as far as practicable and should meet the international classification society's requirement (as applicable). The harbor trial of the following machinery is to be carried out prior to sea trial and the test should meet the international classification society's requirement	1	Lot			0	0
462	Sea Acceptance Trial as per article 1107(d)(3) of Section 7.					0	0
463	Engineering Department (Mechanical) as mentioned in article 1108 of Section 7.	45	working days			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
464	Electrical and radio electrical Department as mentioned in article 1108 of Section 7.	45	working days			0	0
465	Seaman Department as mentioned in article 1108 of Section 7.	15	working days			0	0
466	Gunnery, ordnance and radio electrical department as mentioned in article 1108 of Section 7.	15	working days			0	0
467	Domestic (Cook and Stewart) department as mentioned in article 1108 of Section 7.	5	working days			0	0
468	Medical department as mentioned in article 1108 of Section 7.	5	working days			0	0
469	Steward department as mentioned in article 1108 of Section 7.	5	working days			0	0
470	Complete Hull Fabrication Works based on the class approval	40000	hours			0	0
471	Complete Piping Fabrication Works based on the class approval	10000	hours			0	0
472	Complete Outfitting Fabrication & Installation Works based on the class approval and standard shipbuilding practice	8000	hours			0	0
473	Electrical Workmanship including consumables based on the class approval and standard shipbuilding practice	2000	hours			0	0
474	Navigation & Alarm System Installation & Commissioning based on the class approval and standard shipbuilding practice	1500	hours			0	0
475	Sanitary Works	500	hours			0	0

Sl. No.	Description of the Items	Quantity	Unit	Unit Rate		Total Amount	
				Unit Rate (BDT)	Unit Rate (USD)	Amount (BDT)	Amount (USD)
476	Insulation & Paneling Works	1000	hours			0	0
477	Complete Paint Workmanship	2000	hours			0	0
478	NDT & DPT, Welding Inspection Works	1	Lot			0	0
	Total Cost of Purchasing 1 No. RPV (in BDT as local currency and in USD/EUR/GBP for foreign currency)						
	Total Cost of Purchasing 5 Nos. RPV (in BDT as local currency and in USD/EUR/GBP for foreign currency)						

Special Note:

1. The BOQ is given for guidance only which may be amended as per Section 7 (Technical Specification) based on the offered proven design vessel by the bidder while submitting the tender documents.

2. VAT, TAX, CD and other government charges must be included in the offer.

3. All charges are to be paid as per latest government rule by the bidder.

Enclosure-5

DECLARATION

I (Name)……. on behalf of (Company name) …….confirm that all the points mentioned in the Enclosure-4 of the EOI are considered in our offer. We do hereby declare that the documents and information submitted with the offer are correct. We will be obliged by the decisions of KSY if there is any omission/ falsification of information/ documents furnished by us.

Signature

Name:

Official Seal: