

Technical Specification

A. CUTTER SUCTION DREDGER, 18" (450 mm) discharge diameter.

This specification describes a Cutter Suction Dredger of the dismountable type. The dredger is of a simple and sturdy construction, suitable for heavy duty and durable operations. The sizes and weights of the various dismountable modules permit transportation by road or by ship.

The complete dredger consists of one main pontoon and two side pontoons. These side pontoons will be connected to the main pontoon using heavy steel claws and pins or any suitable option or better ways & means at bottom level and heavy steel plates with bolts at deck level.

During the assembly of the dredger, crane assistance is required.

The dredger can be operated by one man only from the control cabin.

The dredger is to be used in the tropical climate of Bangladesh, with an average rainfall of 2000 mm, air temperature of 5°C to 50°C and a relative humidity of 60% to 100%. All the equipment to be designed to comply the above climate conditions.

The tenderer has to submit detailed Specification of each and every item with its description, drawing, data etc. as required.

A-1. Main Particulars of dredger

	Description of Item	Dimensions/Instructions
1.01	Principal Dimension	
	Length over all (pontoons) (about)	24.00 m
	Breadth (about)	7.50 m
	Depth (about)	2.00 m
	Draught loaded (maximum)	1.25 m
1.02	Dredging installation	
	Inner diameter of suction pipe	450mm/500 mm
	Inner diameter of discharge pipe	450mm
	Discharge distance	1500 m
	Dredging depth up to	14.00 m (ladder angle 45°)
	Dredging Width with 35° swinging angle each side	
	at minimum dredging depth	35.00 m (approx.)
	at maximum dredging depth	30.00 m (approx.)
	Production capacity/output	Output of dredge pump of 450 m ³ /hour (minimum) at a discharge distance of 1500m at 14.0m dredging depth calculated at a volumetric concentration of 20% and deceive solid grain size of 235-440µm. The performance curve/production curve shall be submitted in the tender to support the output.
1.03	Tank capacities	
	Fuel oil approx.	25,000-30,000 litres (approx.). Calibration chart and dip stick shall be provided.
	Ballast/Void approx.	24,000 litres
1.04	Dredger pump	The wearing parts of the Dredge pump shall be made of appropriate material to suit best performances (having proven records of 10 years) in dredging.
	Country of Origin	EU Countries/USA/ Australia/ Canada/Japan
1.05	Engine for sand pump drive (Main Engine)	

	Make	Diesel Marine Engine of reputed make
	Power	Appropriate Power to give min. output of 450 m ³ /hr at a discharge distance of 1500 m.
	Maximum RPM	1800
	Country of Origin	EU Countries/USA/ Australia/ Canada/Japan
1.06	Engine for Auxiliaries	
	Make	Diesel Marine Engine of reputed make
	Power	Appropriate Power for operation of all hydraulic, electric and other auxiliaries.
	Maximum RPM	1800
	Country of Origin	EU Countries/USA/ Australia/ Canada/Japan
1.07	Cutter	
	Type	Crown or equivalent
	Wearing parts on cutting edges	Knives replaceable
	RPM	0-35
1.08	Spuds	
	Diameter (approx.)	500 mm
	Length (minimum)	18.00 m
	Spud tilting facility	Spud tilting facility to be provided
1.09	Deck Crane	One Deck Crane is to be provided for lifting and maintenance of dredge pump and other components with minimum capacity of 3 tons.
1.10	Class	<p>The Hull of the Dredger including its Main Engines, Auxiliary Engines, Generator, electro hydraulic installations etc. shall be built and classed for coastal water under the regulations of the international classification society being a member of the International Association of Classification Societies (IACS) having registered office in Bangladesh. The class certificates shall be handed over to BIWTA.</p> <p>The following rules and regulations (if applicable) are to be complied with:</p> <p>Maritime Regulations of Bangladesh; SOLAS 1974 with latest amendments International Convention for the Prevention of Collision at Sea 1972 International Convention for Load Lines, 1966 IMO stability guideline including weather criteria Other rules and regulations applicable</p> <p><i>Registration & Survey (with Directorate of Shipping /Mercantile Marine Department of Bangladesh) must be completed by supplier's own cost</i></p>
1.11	Operating Cabin	The Operating Cabin is to be properly insulated with air coolers fitted, Considering high temperature of Bangladesh. The Cabin should be Spacious enough for working 3-4 persons (for training etc). To be provided with an adjustable chair for operator/dredge Master. All Controls, instrumentation etc, are to be positioned in the operating desk. Suction depth indicator, dredge pump vacuum and discharge pressure meter are also to be fitted in the operating desk. Any other facility required for operation are to be provided.
1.12	Hydraulic system	Hydraulic system of proven design & reputed make to be used for operation of winches, cutter, spuds etc. All components are to be of proven design for trouble free operation.
	Country of Origin	EU Countries/USA/ Australia/ Canada/Japan
1.13	Anchors and wire ropes	Anchors: 4 Nos. @ 500kg, 8 Nos. @ 300 kg. Side winch wire (fitting): Minimum 150 m on each side.

		Necessary wires, gantry wires, spud slings, spud hoisting wires, mooring ropes etc. to be supplied and fitted with dredger.
1.14	Painting	International reputed paint like Sigma, Jotun etc. must be applied. Colors are to be approved by the Employer.
1.15	Cathodic Protection	Sufficient amount of anodes to be placed on under water hull and ladder for a period of 2 years in salt water.
1.16	Other Installations and accessories	
	Swivel joint with ball sockets	To be provided with the discharge pipeline at the aft of the dredger.
	Automatic Vacuum relief valve	A by pass suction valve to be mounted underwater in the suction line to avoid too high vacuum. The valve is automatically driven through a vacuum signal, but can also be manually controlled from main control desk. .
	Non return Valve	Near the end of the discharge pipe an automatic non-return valve will be fitted to prevent the water from the discharge pipe to run back into the dredge pump. The valve can be disassembled for internal inspection.
	Generator with engine	30 KVA, 220/440Vac, 50 Hz to be used for emergency lifting of ladder, spud
	Harbour Generating set	Diesel generating set with 20KVA power to arrange battery charging, fuel transfer pump operation, emergency lighting, operation of one welding set, cabin air cooler, emergency bilge pump etc.
	SSB Communication set/Cell Phone	SSB Communication/Cell phone set to be provided for each dredger for communication.
	Fuel & running hour meter	Fuel & running hour meter to be provided.
	Dredging depth meter	Dredging depth meter to be supplied
	Depth Indicator	Depth indicator to be supplied
	Lights	In addition to normal lights for operation of the dredger, for night time operation sufficient flood lights are to be provided in suitable locations.
	Portable bilge pump (diesel engine or electric motor driven)	To be operated when dredger is not in operation.
	Portable welding set with diesel engine	400 Amps output with all accessories- 1 set for each dredger.
	Fuel Oil Transfer Pump	Electric motor driven pump to be Provided.
	Mechanical ventilation for the Engine room.	Air Blowers and Exhaust fans are to be provided of adequate capacity and number for proper ventilation considering high temperature and humidity in Bangladesh.
	Tanks	Fuel oil tanks, dirty oil tank, water ballast tanks, fresh water tank and dry tanks are to be provided.
	Store	Two store with rack & wooden floor shall be at PS and SB side under main deck.
	Signal Mast	To be Provided with requisite signal lamps, search lights etc. Complete for navigation.
	Bollard	6 Nos. double bollard shall be provided on the side pontoon of dredger for towing the dredger.
1.17	Other Supplies	To be supplied: a) Lifesaving appliances, i.e., Life jackets, life buoys etc. in adequate number, b) Boatswain's inventory, c) Fire fighting appliances as per rule, d) First Aid box. e) Horn to be provided f) Flood light at the ladder davit to be provided.
1.18	FS Wire Rope	For Side Winch: 4 Coils For Ladder: 2 Coils For dredger Towing: 2 Coils

		<p>Specification:</p> <p>Construction of the Rope: 6x19(12+6+1) FC Normal Tensile Strength: 165 kg/sq.mm Lay of Wire: Right Hand Regular Lay Breaking Load: 17000-18000kg Length per coil: 300 meter Grade: A (Galvanized)</p>
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1.19 Tools for general maintenance and special tools for all engines, sand pump, cutter, hydraulic system, electric system and other works to be provided.

1.19.1 Engine Room Outfit and General Tools:

- 1 - Micrometer, 25 - 50 mm
- 1 - Surface gauge, 290 mm height.
- 1 - Straight edge, 600 mm
- 2 - Inside calipers, 300 & 200 mm
- 2 - Outside calipers, 300 and 200 mm
- 2 - Compass 300 & 200 mm
- 2 - Thermometers 100 C, with casing
- 2 - Straight shank drills 3 & 5 mm
- 1 - set Taps W3/8 - W1
- 1 - Plier, 200 mm
- 6 - Files 250 mm, Coarse and medium, flat, round and half round.
- 3 - Files 200mm, Fine, flat round and half round.
- 1 - set Files, fine
- 3 - File shanks
- 2 - File brushes
- 2 - Hammers, 2 lbs and 1 lb.
- 1 - Wooden hammer
- 1 - Hammer 10 lbs
- 2 - Scrapers, flat and cent
- 1 - Punching centre
- 4 - Punches, 11, 14, 18 & 21 mm
- 4 - Cold chisels 200 & 150 mm, flat & cross-cut
- 2 - Oil groove chisels, 150 x 22 x 5 mm x 130 x 19 x 3 mm
- 1 - Packing knife
- 1 - set Hacksaw frame with 12 blades
- 1 - Vice, 150 mm
- 1 - Oil stone, 150 x 50 x 25 mm
- 4 - Electric torches
- 1 - Chain block, 1 ton
- 1 - Rubber hose for air, complete with coupling, 6mm dia x 10m
- 1 - Copper hammer, 1.35 kg
- 1 - Lead hammer, 1.8 kg
- 1 - Tool box, steel
- 1 - Clock, 2-hand
- 1 - Turning bar for main engine
- 16 (from 3/8 to 1^{1/2})-Double end open spanner
- 16 (from 3/8 to 1^{1/2})-Double end ring spanner
- 24- Socket box wrench
- 2 (300 lb & 500 lb)-Torque wrench 3/4 drive

All tools must be EU countries/Australia/USA/Canada/Japan origin.

A-2. AUXILIARIES AND SERVICES FOR DREDGER

	Description of Item	Dimensions/Instructions
1.01	Production measuring system	Complete set of production measuring system with integrated electro-magnetic velocity/density measuring instrument and production indicator for measuring solid output of dredged material in cubic meters per hour. Cumulative production is also to be recorded. All instruments, computers etc. needed for the system are to be supplied in complete set. If required, prior permission & clearance from Atomic Energy Commission of Bangladesh will be obtained by the supplier.
1.02	Anchor Boom Installations.	Two anchor booms driven by separate hydraulic motor and winches to be supplied for shifting anchors.
1.03	Drawing	<ul style="list-style-type: none"> • Instruction catalogue for dredgers, dredge pump, cutter, hydraulic & electric system, engines, generator, crane and all other accessories to be supplied in English language-3 sets. • Spare parts catalogue for all components to be supplied in English language-3 sets. • G.A and other relevant drawings to be supplied-3 sets.
1.04	Training	
a.	Training abroad	Special training is to be arranged for 2 (two) Mechanical/Electrical & Electronic background Engineers for trouble shooting of dredger. Air ticket, accommodation, food, transport and all allowances to be arranged by the supplier for the trainees. The training period should be at least 1 (one) month excluding traveling.
b.	Training in Bangladesh	On the job training is to be arranged for 28 (twenty eight) days in Bangladesh for Engineers, technicians & operators (dredger operation crew, engine room crew and repair & maintenance crew). Detailed programme is to be submitted before delivery of the dredger.
c.	Training in Bangladesh	28 (twenty eight) theoretical training and demonstration of dredging, dredging equipments etc. for 6 (six) technical persons in Bangladesh.
1.05	Cost of operation for test and trial	All Cost of operation will be arranged by the supplier .
1.06	Operation contract for dredgers	<p>Requirement:</p> <p>Very high skilled operation crew for operation of the dredgers.</p> <p>Operation period:</p> <p>8(eight) months in a year (October to May). Working period-10 hours/per day x 6 days per week.</p>

		<p><u>Skill Level:</u></p> <p>1) Dredger Master/Operator of very high skill level is to be engaged. The average production output of dredger achieved should be at least 90% of the rated capacity. This may be calculated on weekly basis. Should be capable of planning the dredging operator independently as per project requirement in consultation with the project engineers. Should be able to communicate in English.</p> <p>2) Engineers (Mechanical, Electrical etc.) of very high skill level experienced in supplied model of dredger is to be engaged. Should be able to Communicate in English. To be fully capable of operating all instruments fitted in the dredger.</p> <p><u>Cost of travel and accommodation etc:</u></p> <p>During the operation contract period, all cost including traveling to & from Bangladesh, fooding, lodging, accommodation for the engineers, dredge masters will be borne by the supplier.</p> <p><u>Supporting Crew:</u></p> <p>Other Supporting Crew for dredger will be provided by the BIWTA</p> <p><u>Cost of operation:</u></p> <p>All Cost of operation (fuel & lub oil) will be arranged by the BIWTA.</p>
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A-3. List of Spare Parts for 18" (450 mm) 1 No. Cutter Suction Dredger.

MAIN ENGINE (DREDGE PUMP ENGINE)

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Cylinder liner with rubber packing	01 set (1 set=1 No.x No. of Cylinder)		
2	Piston ring	01 compt. set (1 set=1ring group x No. of Cylinder)		
3	Exhaust valve	01 set (1 set=2 Nos. x No. of Cylinder)		
4	Inlet valve	01 set (1 set=2 Nos. x No. of Cylinder)		
5	Insert (valve seat) Exhaust	01 set (1 set=2 Nos. x No. of Cylinder)		
6	Insert (valve seat) inlet	01 set (1 set=2 Nos. x No. of Cylinder)		
7	Valve guide Exhaust	01 set (1 set=2 Nos. x No. of Cylinder)		
8	Valve guide Inlet	01 set (1 set=2 Nos. x No. of Cylinder)		
9	Valve Spring	01 set (1 set=4 Nos. x No. of Cylinder)		
10	Crank Shaft bearing (Main bearing)	01 set (1 set=1 pair x No. of Cylinder)		

11	Cont. rod bearing (Big-end-bearing)	01 set (1 set=1 pair x No. of Cylinder)		
12	Piston	01 set (1 set=1 No.x No. of Cylinder)		
13	Injector nozzle	01 set (1 set=1 No.x No. of Cylinder)		
14	Bolt (Cont. rod)	10 nos.		
15	Gasket (Cylinder head)	01 set (1 set=1 No.x No. of Cylinder)		
16	Plate thrust (Thrust bearing)	01 set (1 set=1 pair)		
17	Piston Pin (Gudgeon Pin)	10 nos.		
18	Plunger with barrel for fuel pump	01 set (1 set=1 No.x No. of Cylinder)		
19	Complete engine overhauling gasket Kit	01 set (1 set=2 Nos. for complete engine)		
20	Fresh and sea water pump rebuilt kit	01 set (1 set=2 Nos. for each complete pump)		
21	Lub oil filter	15 nos.		
22	Fuel filter	15 nos.		
23	Connecting Rod	01 set (1 Set=1 No.x No. of Cylinder)		

HYDRAULIC ENGINE

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Cylinder liner with rubber packing	01 set (1 set=1 No.x No. of Cylinder)		
2	Crank shaft bearing (main bearing)	01 set (1 set=1 pair x No. of Cylinder)		
3	Cont. rod bearing (Big-end-bearing)	01 set (1 set=1 pair x No. of Cylinder)		
4	Piston ring	01 set (1 set=1ring group x No. of Cylinder)		
5	Head gasket	01 set (1 set=1 No.x No. of Cylinder)		
6	Piston	01 set (1 set=1 No.x No. of Cylinder)		
7	Piston Pin (Gudgeon pin)	20 Nos		
8	Thrust bearing	01 set (1 set=1 pair)		
9	Exhaust valve	01 set (1 set=2 Nos. x No. of Cylinder)		
10	Inlet valve	01 set (1 set=2 Nos. x No. of Cylinder)		
11	Insert (valve seat) Exhaust	01 set (1 set=2 Nos. x No. of Cylinder)		
12	Insert (valve seat) Inlet	01 set (1 set=2 Nos. x No. of Cylinder)		
13	Rocker arm/Cam Shaft	4 nos.		
14	Valve guide Exht. & Inlet	01 set (1 set=2 Nos. x No. of Cylinder)		
15	Push rod	2 nos.		
16	Injector nozzle	01 set (1 set=1 No.x No. of Cylinder)		
17	Plunger with barrel for fuel pump	01 set (1 set=1 No.x No. of Cylinder)		
18	Complete engine overhauling	01 set		

Sl. No.	Description	Required Quantity	Unit Price	Total Price
	gasket Kit	(1 set=2 Nos. for complete engine)		
19	Cooling water pump rebuilt kit	01 set (1 set=2 Nos. for each complete pump)		
20	Lub oil filter	10 nos.		
21	Diesel filter	10 nos.		
22	Connecting rod bearing bolt	10 nos.		
23	Connecting rod	01 set (1 Set=1 No.x No. of Cylinder)		

GENERATOR ENGINE

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Cylinder liner with packing	01 set (1 set=1 No.x No. of Cylinder)		
2	Piston ring	01 compt. set (1 set=1ring group x No. of Cylinder)		
3	Piston with Pin (Gudgeon)	01 set (1 set=1 No.x No. of Cylinder)		
4	Exhaust valve	01 set (1 set=2 Nos. x No. of Cylinder)		
5	Inlet valve	01 set (1 set=2 Nos. x No. of Cylinder)		
6	Insert (for exhaust valve)	01 set (1 set=2 Nos. x No. of Cylinder)		
7	Insert (for Inlet valve)	01 set (1 set=2 Nos. x No. of Cylinder)		
8	Valve spring	15 nos.		
9	Main bearing	01 set (1 set=1 pair x No. of Cylinder)		
10	Big-end-bearing	01 set (1 set=1 pair x No. of Cylinder)		
11	Injector nozzle	01 set (1 set=1 No.x No. of Cylinder)		
12	Plunger and barrel for fuel pump	01 set (1 set=1 No.x No. of Cylinder)		

DREDGE PUMP ASSY. & OTHER ACCESSORIES

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Pump case	1 no.		
2	Impeller	1 no.		
3	Presser plate suction side	4 Nos.		
4	Presser plate engine side	4 Nos.		
5	Impeller sleeve	2 nos.		
6	Sand pump impeller driving shaft	2 Nos.		
7	Cutter Frame	01 nos.		
8	Cutter Blade/Cutter teeth	4 Sets ((1 set means total number of blades/teeth for one complete cutter)		
9	Cutter Shaft	01 No.		

Sl. No.	Description	Required Quantity	Unit Price	Total Price
10	Cutter Shaft Cutless bush	01 No.		

LADDER ASSY.

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Suction hose	4 Nos.		
2	Hydraulic pump/hydraulic driving unit	01 No.		
3	Cartridge Kit	10 Nos.		

B. CRANE BOAT

B-1. GENERAL PARTICULARS

1.0 Main characteristics

The vessel shall be provided with heavy steel fendering all around, Flush type Engine Room removal hatch, heavy deck crane support foundation, towing bitt, Propeller Nozzle (to create extra thrust), etc.

The Hull of the vessel including its machinery shall be built and classed under the rules and regulations of the International Classification Society like Lloyds Register of Shipping (LRS)/ American Bureau of Shipping (ABS)/ Nippon Kaiji Kyo kai (NK) /Bureau Veritas (BV). The Appropriate class notations to be mentioned in the offer. The other rules and regulations applicable for construction of this vessel including IMO stability guideline covering weather criteria shall be followed.

1.01 Principal dimension

Length O.A (about)	:	10.00-12.00 m
Breadth (about)	:	6.00 m
Depth (moulded)	:	1.80 m
Draught loaded (maximum)	:	1.20 m

1.02 Propelling Machinery

Number of engines	:	1 No. (Single screw)
Make	:	Diesel marine engine of reputed make
Country of origin	:	EU Countries/USA/ Australia/ Canada/Japan
Power	:	Required to achieve the speed of 6.50 knots
RPM	:	Not exceeding 2000
Speed (Full loaded condition)	:	6.50 Knots

1.03 Performance

Deck Crane capacity	:	Minimum 2 ton at 8 m out reach
Slewing angle	:	360°

Fuel oil tanks 100% full : about 7-10 cubic meters

1.04 General Arrangement

The vessel will be a single screw diesel propelled, steel, crane boat of flush-deck type having a transom stern and a complete continuous deck below which the space will be subdivided by three transverse watertight bulkheads into four compartments.

- (1) Fore peak;
- (2) Boatswain's Store;
- (3) Engine room.
- (4) Aft peak & steering gear compartment

1.05 Materials & Workmanship

The Builder will supply all materials, equipment and machinery required for completion of the vessel. All these materials and equipment supplied will be new and of latest design and intended for marine use and also in accordance with the rules and regulations mentioned above and also other requirements of the governing bodies concerned.

Steel materials used for the vessel will be open-hearth or electric furnace processed mild steel of a good and uniform quality certified by the Classification Society for compliance with its rules.

All workmanship inspect of the construction of the vessel will be in accordance with the normal shipbuilding practice for this kind of vessels.

1.06 Plans and Instruction Books

Prior to the execution of the work concerned, 2 (two) copies of each of the following plans and booklets shall be submitted to the Purchaser for their approval. Such approval of the Purchaser shall not relieve the supplier of his obligations under this contract.

- i) Specifications
- ii) General arrangement
- iii) Lines & offsets
- iv) Hydrostatic curves
- v) Capacity plan (preliminary)
- vi) Stability booklet
- vii) Midship section
- viii) Construction profile & deck plan
- ix) Shell expansion
- x) Rudder & rudder carrier
- xi) Hull construction plans
- xii) Steering gear arrangement
- xiii) Scheme of painting
- xiv) Engine room arrangement
- xv) Main engine specification & assembly
- xvi) Auxiliary engine specification & assembly
- xvii) Hydraulic crane specification and assembly plan
- xviii) Load diagram of hydraulic crane
- xix) Range diagram of hydraulic crane
- xx) Load and Range diagram of crane
- xxi) Hydraulic pumps, specification and assembly plan
- xxii) Diagram of standard slewing arc
- xxiii) Diagram of cooling water pipe systems in engine room
- xxiv) Diagram of bilge, ballast and water service pipe systems in engine room
- xxv) Diagram of lubricating oil pipe system in engine room
- xxvi) Diagram of fuel oil pipe system in engine room
- xxvii) Diagram of main electric feeder circuits
- xxviii) Diagram of electric lighting, navigation aids etc., feeder circuits
- xxix) Main switchboard assembly plan & connecting diagram

2 (two) copies of each of the following plans and booklets shall be submitted to the Purchaser for their approval upon completion of vessel and before test& trial.

- i) List of deck inventory
- ii) List of spares, tools and outfit of machinery part
- iii) List of spares and accessories of electric part
- iv) Schedule of inclining test
- v) Schedule of official sea trials
- vi) Schedule of various test and trials to be attested by Purchaser.

Upon the delivery of the vessel, the following finished plans shall be prepared and delivered to the purchaser.

The number of copies shall be three (3) for plans and two (2) for booklets.

All relevant as fitted and as built drawings and booklets from the above list will also be supplied.

- Capacity plan with tanks & deadweight scales
- Final calculation for weight, trim and stability
- Stability curves
- Results of inclining test
- Results of official sea trials
- Results of various tests and trials for machinery part
- Results of various tests & trials for electric part
- Docking plan

One set of the following finished plans shall be mounted on frames and displayed onboard:

General arrangement
Arrangement of safety equipment

Three (3) copies of suitable instruction books written in English shall associate the following machinery and equipment:

Steering gear
Main engine
Generators
Navigation equipment
Crane

1.07 Tests & Trials

Crane, Main Engine, Generators, switch board, electric motors and control gears and other machinery, equipment and systems shall be tested under the working conditions.

Insulation tests shall be made for all electric equipment and systems after installation onboard.

Results of these tests and trials shall be submitted to the Purchaser immediately after completion.

1.08 Registration & Survey must be completed by suppliers' own cost

B-2. HULL

2.01 Steel Work in General

The hull including superstructures will be constructed of steel throughout on the longitudinal system of framing. Good continuity of structural members in the basic hull structure will be maintained, and where members are discontinuous, continuity will be provided with by means of suitable tapers, overlaps, doubler plates and/or brackets.

The workmanship will be such as to ensure reasonable fair lines and smooth surfaces, attention will be given to the neatness of structural connections. Cuts in structures for engineering systems such as ventilating ducts, piping systems and electrical cables will be made according to standard shipbuilding practice, and portions unduly weakened by cutting such holes will be suitably compensated.

2.02 Hull Scantlings:

The hull hunting scantlings shall be as per the rules of classification society. A guidelines (not restrictive) scantlings may be as follows:

-	Sides, ends, bottom and deck plating	10 mm
-	Bulkheads	6 mm
-	Longitudinal frames angles (spacing 500 mm)	75 x75 x 9mm
-	Web frames sections (spacing 1000mm & 1500mm)	200 x125 x 8mm
-	Stiffeners on bulkheads (angles)	65 x 65 x 6mm
-	Steel fender all round at deck level consisting of a welded flatbar	500 mm x 28mm

2.03 Welding

Electric arc welding will be applied to all connections of structural members. Portions of members where welding is to be applied will be well prepared prior to welding work in order to obtain good results. Qualified welders with coated electrodes, and automatic welding by "Union melt" or equivalent process will execute manual welding. The materials and the procedure of welding will comply with the requirements of the Classification Society.

2.04 Keel

The Keel will be of flat plate type and properly shaped and secured.

2.05 Steel Skeg

The end of propeller shafts will be supported by a skeg of steel construction. The boss will be of cast steel. The rubber bearing lined bronze or equivalent materials bush will be used in the boss.

2.06 Rudder

The vessel will have one rudder of single plate semi-balanced type, connected to the rudderstock by a flange coupling.

2.07 Bottom Construction

The bottom will be of single bottom type constructed.

Under the main engines, strong continuous engine girders with strong top plates will be provided. The engine room webs will be 500mm apart following the class rules and will terminate on the engine girder. Inside of the engine, brackets will support girder. In the forward region, the bottom will be reinforced as required by the rules.

2.08 Web Frames and Side Stringers

Web frames will be fitted at a space of 1000 mm and 1500 mm apart following the class rules and welded to the shell plating. A side stringer will be provided on each side in way of the forward hull and the engine room.

2.09 Bulkheads

Main watertight transverse bulkheads will be arranged as shown on the general arrangement plan and extended up to the main deck. These bulkheads will be of welded flat type reinforced with vertical stiffeners bracketed at top and bottom as far as practicable. All bulkheads will be tested as required by the rules.

2.10 Shell Plating

All butts and seams of the shell plating will be welded. The shell plating in way of large openings will be properly compensated with doubler plates or by increasing plate thickness.

2.11 Main Deck

The main deck will be constructed with steel plates. Thicker plates or doubler plates will be laid at corners of large openings where considered necessary.

The deck stringer plates will be directly welded to the sheer strakes. Beams will be fitted transversely at every web frame & welded to the deck plating. Under-deck girders will be provided to support and stiffen the deck.

The deck will be well reinforced in way of deck machinery, deck crane & other heavy articles.

2.12 Machinery Foundation

Foundations under machinery will be of welded construction well connected to the bottom structure, and strong enough to stand up to the loads and vibrating forces of the machinery installed thereon. The top plates, webs and brackets will be of sufficient thickness. The main engine foundation will consist of continuous engine girders with strong top plates, constructed as an integral part of the bottom structure. Care will be taken to keep efficient continuity of strength at their ends. Foundations of the generating units, engine room auxiliaries, deck machinery, crane, etc., will be constructed on structures, which are to be suitably reinforced.

2.13 Wheelhouse

Wheelhouse will be constructed of steel plate. Sidewalls will be reinforced with vertical stiffeners and the roof will have transverse beams as necessary. Girders will be provided as necessary.

2.14 Tanks

Tanks will be arranged as shown on the general arrangement plan and constructed integral with the hull structure. Necessary pipelines, i.e. filling, suction, sounding and air escape pipes and also access manholes will be provided for these tanks.

2.15 Hull Fittings

2.15.1 Mast

A steel mast will be erected on the wheelhouse top to carry mast lamp brackets and a halyard for hoisting flags and spreading antennas. The mast will be collapsible.

On the wheelhouse top two steel board light boxes will be placed for the P.S. and S.B. lights.

2.15.2 Mooring & Anchoring

Double bollards of size 168 mm dia x 8 mm thick following the class rules will be arranged on the fore and aft, at port side and starboard side on the main deck.

2.15.3 Hoisting eyes (for Purchaser's use)

For hoisting, the vessel will be provided with 4 (four) hoisting eyes through the deck to the web frame construction.

2.15.4 Steering Gear

One set of manual hydraulic steering gear, suitable for single-rudder arrangement will be installed at ship's aft. The steering gear will be energized by manual hydraulic cylinder connected to the steering wheel in the wheelhouse. The steering gear will be capable of moving the rudder from 35 degrees on one side to 35 degrees on another side within about 15 seconds. Emergency steering arrangement will be provided.

2.15.5 Fender

Steel fender consisting of a welded flat bar of 500mm x 28mm will be provided all around at deck level of the vessel.

2.15.6 Stairways, Ladders and Steps

All stairways will be of steel. These stairways will have non-skid treads and galvanized tubular steel handrails. Steel vertical ladders will be fitted for access to the wheelhouse top, etc.

2.15.7 Hatches and Manholes

On the main deck and above the engine room, one large watertight hatch will be fitted for engine removal. The engine room entrance to be situated against the wheelhouse and will be provided with a watertight hatch on a raised coaming. For the store and the forepeak, watertight hatch will be provided. Oval manholes will be provided for access to tanks. Bolted flush steel covers will close these manholes.

2.15.8 Doors

The wheelhouse will have hinged aluminum alloy water tight door.

2.15.9 Natural lighting and Ventilation

One ventilation cowl will be provided for adequate natural ventilation of the engine room. Light alloy framed windows of fixed and hinged up type will be fitted on walls of the wheelhouse. Extruded aluminum glassed with 6mm thick glass fitted with long bolts and phenol resin washer will be provided.

A 250-mm dia clear view screen will be provided.

2.15.10 Sound Signal

On the wheelhouse top an air whistle will be fitted, fed by an air compressor fitted in the steering wheel casing.

2.15.11 Life Saving Appliances

The following life saving and signal appliances will be supplied and to be in accordance with rules and regulations applicable:

Buoyant apparatus	1 No.
-------------------	-------

Life buoy, solid	2 Nos.
Life jacket	2 Nos.
Self-activating water light	1 No.
Self-activating smoke signal	1 Nos.

2.15.12 Fire Fighting Systems and Appliances

A deck wash connection and fire main pipeline will be installed along one side of the main deck. This line will be fed with river water by the general service pump and the bilge and ballast pump. Hydrants will be suitably arranged on the fire main line so that any part of the vessel can be reached by a powerful water-jet. Canvas fire hoses of 1.5" bore and 18 meters in length, complete with nozzle, will be supplied and stowed in red paint cases. Portable fire extinguishers will be supplied as specified elsewhere as per the requirement of the rules and regulations.

2.15.13 Cathodic Protection

The vessel will be equipped with a cathodic hull protection system for the under water parts of the hull with sufficient zinc anodes of 3 kg. and 1.50 kg.

2.15.14 Markings

The ship's name in both English and Bengali letters and the draft marks in Arabic numerical in metric scale will be cut from steel plate and welded on the shell, and painted as directed by the purchaser. Draft marks will be fitted at the bow, stern and amidships in metric scale.

2.16 Wheelhouse Furnishing Schedule

2.16.1 Wheelhouse

- 1 - Fan
- 1 - Compass table
- 1 - Steering pedestal
- 1 - Foot grating
- 1 - Flag rack
- 1 - Magnetic compass
- 1 - Binocular
- 1 - Nav. lamp indicator
- 1 - Voice tube
- 1 - Thermometer
- 1 - Clear view screen,
- 1 - Engine remote control console
- 1 - High chair

All the windows except middle windows in the wheel house must be easily open able Arrangement shall be provided to permit rapid shut down and effective closer in case of weather and sea condition. In wheel house, fuel & running hour meter to be provided.

2.16.2 Boatswain's Store

The space under the main deck between the forepeak and engine room shall be used as a boatswain's store.

The shell sides shall be sparred with wooden battens up to a suitable height and the floor laid with wooden gratings. Wooden shelves shall be fitted along the shell sides.

2.17 Deck Piping

2.17.1 Piping in General

Pipes, valves, cocks, flange, etc., will be of such qualities and dimensions as to comply with rules of the Classification Society. Pipes will be efficiently supported or embraced to stand up to vibrations. Care will be taken where pipes are concealed by room furniture so that reasonable access may be provided for overhauling. Where pipes pass through watertight bulkheads or decks, bulkhead or deck pieces will be fitted. Where the danger of mechanical damage is expected, pipes will be well protected by means of wooden or steel covering or guards.

2.17.2 Pipe Materials

Pipes will generally be steel pipes of such qualities and dimensions as to comply with rules of the Classification Society. Galvanized pipes and flanges will be used for piping not coming into contact with oil.

2.17.3 Wash deck and Fire Main Piping

The wash deck and fire main pipeline will be installed along one side on the main deck. The pipeline will be supplied with river water by the general service pump and the bilge and ballast pump in the engine room.

2.18 Coating Protection

2.18.1 Surface Preparation

Prior to any sand/grit/wet blasting, all sea chests strainer plates will be removed and all hull openings, transducers, anodes, waster pieces, bearings, stern tube openings, fiber glass covers (over shafts and domes) and propellers will be plugged, covered, and otherwise protected from damage or contamination during surface preparation and coating application.

All steel surfaces will be prepared to near white, blasted to SA 2½ standard.

After sand/grit/wet blasting, surfaces will be brushed with clean brushes, blown off with compressed air, or cleaned by vacuum to remove all traces of blast products and dust.

The surfaces to be painted will have the specified surface preparation at the time of application of the paint. If the surface is degraded or contaminated subsequent to surface preparation and prior to painting, the surface will be restored before paint application.

In order to prevent degradation or contamination of the prepared surfaces, the first coat of paint will be applied as soon as possible after the surfaces have been prepared. The first coat will always be applied the same day as surface preparation is completed. Succeeding coats will be applied before contamination of the under surface occurs.

After surface preparation, surfaces will be brushed with clean brushes, blown off with compressed air, or cleaned by vacuum to remove all traces of blast products and dust.

Whenever sand/grit/wet blasting or spray painting is specified for surface preparation of exterior steel surfaces in places where applicable regulations and laws prohibit release of blast materials and paint into the atmosphere, the surfaces shall be enclosed in a cover adequate to contain the blast materials and paint.

Cleaning and painting will be so scheduled that detrimental amounts of dust or other contaminants do not fall on wet, newly painted surfaces.

2.18.2 Painting Schedule (international reputed paint must be applied)

1. BOTTOM & BOOT TOP AREA (COALTAR EPOXY SYSTEM)

- a) Anti Corrosive System
 - i) Epoxy Primer 1x50 Microns
 - ii) Coaltar Epoxy 1x100 Microns
 - iii) Modified Coaltar Epoxy (Sealer Coat) 1x100 Micron
- b) Antifouling System
 - i) Self Polishing Antifouling Paint (for 24 months protection) 2x50 Microns

2. TOP SIDES (RECOATABLE EPOXY SYSTEM)

- a) Epoxy Primer 1x50 Microns
- b) Recoatable Epoxy Undercoat 1x100 Microns
- c) Recoatable Epoxy Finish 1x100 Microns

- | | | |
|----|--|---------------|
| 3. | DECK (RECOATABLE EPOXY SYSTEM) | |
| | a) Epoxy Primer | 1x50 Microns |
| | b) Recoatable Epoxy Undercoat | 1x100 Microns |
| | c) Recoatable Polyurethane/ Epoxy Finish | 1x100 Microns |
| 4. | BILGES/BALLAST/TANKS
(COALTAR EPOXY SYSTEM) | |
| | a) Epoxy Primer | 1x50 Microns |
| | b) Coaltar Epoxy (two different shades) | 2x100 Microns |
| 5. | SUPERSTRUCTURE-EXTERIOR
(RECOATABLE EPOXY SYSTEM) | |
| | a) Epoxy Primer | 1x50 Microns |
| | b) Recoatable Epoxy Undercoat | 1x75 Microns |
| | c) Recoatable Epoxy Finish | 1x35 Microns |
| 6. | SUPERSTRUCTURE-INTERIOR
(RECOATABLE EPOXY SYSTEM) | |
| | a) Epoxy Primer | 1x50 Microns |
| | b) Recoatable Epoxy Undercoat | 1x75 Microns |
| | c) Recoatable Epoxy Finish | 1x35 Microns |
| 7. | DECK FITTINGS
(RECOATABLE EPOXY SYSTEM) | |
| | a) Epoxy Primer | 1x50 Microns |
| | b) Recoatable Epoxy Undercoat | 1x75 Microns |
| | c) Recoatable Epoxy Finish | 1x35 Microns |
| 8. | MACHINERY SPACE (EPOXY SYSTEM) | |
| | a) Below Floor Plates | |
| | i) Epoxy Primer | 1x35 Microns |
| | ii) Recoatable Epoxy Coating | 1x75 Microns |
| | b) Above Floor Plates | |
| | i) Epoxy Primer | 1x50 Microns |
| | ii) Recoatable Epoxy Undercoat | 1x75 Microns |
| | iii) Recoatable Epoxy Finish | 1x35 Microns |
| 9. | CHAIN LOCKER, ANCHORS, CHAINS & VOID SPACES | |
| | High Build Bituminous Paint | 1x250Microns |

2.18.3 Pipe work Coloring

All exposed piping systems will be identified with colour bands in accordance with the following colour schemes:

- | | | | |
|----|-------------------|---|-------------|
| 1) | Bilge and Ballast | : | Black |
| 2) | Firemain | : | Bright red |
| 3) | Fuel oil | : | Brown |
| 4) | Lub oil | : | Yellow |
| 5) | Hydraulic oil | : | Purple |
| 6) | Sea suction | : | Green |
| 7) | Seawater cooling | : | Light green |
| 8) | Compressed air | : | White |

2.19 Deck Inventory

- 2.19.1 Anchors, Chain Cables and Ropes
 - 2 - Anchor, 200 kg. each
 - 2 - Chain cable, high strength, welded, 8 mm dia 45 m line
 - 1 - Stream wire, F.S. WR. 6 x 24, 16mm dia, 90 m in length
 - 1 - Spare anchor shackle
 - 2 - Spare joining shackles
 - 1 - Chain hook
 - 1 - Shackle punch
- 2.19.2 Compass & Nautical Equipment
 - 1 - Bell, 150 mm in diameter
 - 1 - Compass, table mounted, 150 mm card diameter
- 2.19.3 Navigation Lights and other Lamps.
 - 1 - Starboard side lamp, electric
 - 1 - Port, side lamp, electric
 - 3 - Mast head lamp, electric
 - 1 - Stern lamp, electric
 - 1 - Anchor lamp, electric
 - 1 - Search light (200 mm dia 500 watts)
- 2.19.4 Signal Equipment
 - 1 - Foghorn
 - 3 - Black balls
 - 2 - Rocket signals
 - 4 - Parachute signals
- 2.19.5 Flags, etc.
 - 1 - Bangladesh ensign
 - 1 - Set-hand signal flags
 - 1 - Set-International Signal flags
 - 1 - International code of signal
- 2.19.6 Canvas Covers
 - 1 - each-Rigging screw cover
 - 2 - Chain pipe covers
 - 1 - Compass cover
 - 2 - Searchlight covers
- 2.19.7 Fire Fighting Appliances
 - 1 - Co₂ extinguisher - 6 kgs
 - 1 - Powder extinguisher - 7 kgs.
 - 1 - Deck-wash connection consisting of a deck valve with 1½" hose coupling and hose.
 - 2 - Nozzles of required size
 - 1 - Breathing apparatus
 - 1 - Fire axe
 - 1 - Flame safety lamp
- 2.19.8 Boatswain's & Carpenter's Stores
 - 2 - Sounding rods
 - 1 - Wooden spike
 - 1 - Steel spike
 - 2 - Chipping hammers
 - 1 - Hand hammer
 - 1 - Claw hammer
 - 1 - Chisel
 - 1 - Plane
 - 1 - Axe
 - 1 - Tinman's scissors
 - 2 - Oil stones
 - 1 - Tape measure
 - 1 - Crow bar
 - 1 - Serving board

- 10 - Padlocks
- 2 - Hawsers gratings
- 2 - Rat guards
- 1 - Serving mallet
- 2 - Paint scrapers
- 2 - Paint scrapers with long shafts
- 4 - Paint brushes
- 2 - Wire brushes
- 1 - Oil can
- 1 - Oil funnel
- 1 - Oil feeder
- 1 - Portable oil lamp
- 1 - Portable hand bilge pump
- 1 - Shifting spanner
- 1 - Bottom plug spanner
- 1 - Filling pipe spanners
- 2 - Spanners
- 2 - Tar brushes
- 1 - Pincer
- 2 - Sounding pipe spanners
- 1 - Key box
- 1 - Key hanger board

B-3. MACHINERY

3.1 General Description

All machinery including main and auxiliary engines, crane, pumps, equipment etc. will be of approved type and supplied with certificates as required by the classification society. All such machinery will be of reputed make, popular and well known in Bangladesh and have proven satisfactory after sales service and spare parts facilities. We shall submit a proposal to the Purchaser on the make and model of equipment. No machinery will be procured/supplied or installed without the prior written approval of the purchaser.

3.2 Main Engine

The propulsion machinery will be brand new, popular and well known in Bangladesh, which has proven after sale service facilities and readily available spare parts.

The power for propulsion will consist of one unit of marine diesel engine complete with all accessories, pumps, etc. as follows:

Make	: Reputed make
MCR	: Required to achieve the speed of 6.5 knots
RPM	: Not exceeding 1800 at MCR
Cooling System	: Fresh water heat exchanger cooled.

3.3 Propeller

The propeller will be of standard 3/4 - blade type made of manganese bronze.

3.4 Propeller Protection

At the outside of propeller, a propeller protection thrust increasing fixed nozzle will be fitted.

3.5 Propeller Shaft

The propeller shaft will be of high quality steel and covered with stainless steel in way of after bearing. The bearing will be of rubber cutlass.

3.6 Stern Tube

The mild steel stern tube will be of heavy construction with a sturdy connection to the hull at the fore end and will contained forward and aft bearing bushes and stuffing gland to meet the rules of Class.

3.7 Auxiliary Sets

The electric power plant will consist of one main diesel driven generator set and one harbor use diesel generator set, installed in the engine room complete with the driving unit. Capacity of the main generator will be such that it can meet the full requirement under normal navigation etc. The harbor generator set will be sufficient for necessary pump, light etc. when the vessel lies at anchor.

3.7.1 Main Generator

Make - reputed make
Prime mover Make – reputed make
Alternator Make - reputed make
25 KVA at 1500 rpm
220 V AC, 50Hz, 1 Ph, 0.8Pf

3.7.2 Harbour Generator

Make – reputed make
5kW at 1500 rpm
220 V AC, 50Hz, 1 Ph, 0.8Pf

3.8 Steering Gear

One manual hydraulic system, as described in section 2.15.4, will be provided with steering stand in wheelhouse. In case of failure of the system, alternative (Manual steering) arrangement will be provided.

3.9 Bilge/Ballast Pump

One bilge pump driven by the main engines will be supplied. Two double acting hand bilge pumps will be supplied and fitted, one in the engine room and one in the forepeak for forepeak and store.

Make - reputed make
Motor - 0.75 kW

3.10 General Service Pump

One (1) horizontal self-priming centrifugal pump will be supplied.

Make - reputed make
Motor - 0.75 kW

3.11 Engine Room Ventilation

For adequate natural ventilation of the engine room one ventilation cowl will be provided.

3.12 Engine Exhaust

Insulated exhaust pipes with silencers will be provided as required for end exhaust.

3.13 Control and Alarms

The main engine revolutions and gearbox operation will be mechanically remote controlled from the wheelhouse. An instrument panel will be fitted in the wheelhouse dashboard, complete with stopping button and starting key, optical and acoustical alarms, meters etc.

The alarm system will consist of a separate control light for each alarm and combined electrical horn will be provided for the engine:

- Temperature of cooling water
- Main engine oil pressure
- Gear oil pressure (only control lamp)

A push button will be fitted to reset the alarm horn.

Following gauges will be provided for main and auxiliary engines:

- Oil pressure
- RPM
- Cooling water temperature.

3.14 Cooling System

The main engine will be cooled by its own closed fresh water-cooling circuit.

3.15 Deck Machinery

One hydraulically operated crane of 2.0 ton hoisting capacity at 8 meters radius will be provided/fitted.

B-4. ELECTRICAL INSTALLATION

4.1 General

Only good quality marine fittings shall be supplied and fitted.

Complete electrical system is to be designed and installed in accordance with classification society and other rules and regulations concerned.

Everything necessary for the working of the electrical system whether specially mentioned or not, is to be supplied and fitted to the satisfaction of the Classification Society.

4.2 Installation Standard

These are to the rules and regulations of the Classification Society for the class and type of vessel specified.

4.3 Cables:

All cables employed for the vessel shall comply with the requirements of the classification society rules. In general, all cables are to be ERP insulated, PVC sheathed and steel wire braided marine cables.

In general, cables are to be arranged and laid in a neat manner adequately supported on cable trays supported by galvanized steel hanger and fitted with supporting clips.

Where cables are exposed to weather, they are to be protected by steel pipe (SGP).

4.4 Power Sources:

a) AC Power

Two in number as detailed in machinery specification.

b) DC Power for starting, lighting and emergency

Two (2) batteries with 12 V, 200 Ah. each, shall be installed in lead plate lined steel box. The battery shall be secured and placed on a wooden platform. On the engine a 40 Amp. 24 V alternator shall be mounted to charge the battery. The batteries to be used for electrical starting of the engine and supplying for lighting and other electrical equipment.

4.5 Switchboard

The switchboard shall be placed in the wheel house, with double pole, moulded case type circuit breakers or fuse with switch for the following group:

- Navigation lights
- Second top light
- Search light
- Whistle

- Wipers
- Clear view screen
- Main engine and instruments

A time switch shall be fitted in the switchboard for the engine room lighting. Meters shall be provided for voltage and charging/discharging of the battery.

4.6 Shore connection 440 V:

A wall plug with 20m cables, connected to a fuse box with 440V plug socket.

4.7 Lighting

a) Engine room

5 bullseyes 20W each with time switch in wheel house on switchboard.

b) Wheelhouse

One ceiling light 20W with diffuser for variable illumination. One 8 W light to facilitate further lighting for all time operation.

c) Main deck

Waterproof deck lights of 60W at the aft and fore side of the wheelhouse or near the steering position as is required.

d) Navigation Lights

- 1 No. Starboard lamp
- 1 No. Port lamp
- 1 No. Stern lamp
- 1 No. Anchor lamp
- 1 No. Masthead lamp

Make - reputed make

e) Deck flood Lights

Flood lights will be of 300 W capacity each. Two will be fitted onboard.

Make - reputed make

4.9 Nautical Equipment

a) Signaling Lamp

A morse lamp will be fitted on main mast trunk and operating key on steering console.

b) Search light

A 20 cm 500 watt. searchlight will be fitted on top of wheelhouse with provision for movement up and down as well as all-round with control arrangement located conveniently on the right of the wheel. One set of spare bulbs will be supplied.

Make - reputed make

c) Whistle/Horns

On the wheelhouse top a horn will be fitted fed from A/C power system, control in the steering wheel as described in sec 2.15.11.

5. Clear view Screen

One standard clear view screen will be fitted in one of the front windows of the wheelhouse.

B-5. TOOLS

With the vessel complete with engine, equipment, tools, accessories and tools and on board spare parts will be provided & supplied. List is provided hereunder.

5.1 TOOLS

Description	Qty.
Deck	
Wire brush	6
Cable punch	2
Cold chiesel 150mm	1
Cold chiesel 220 mm	1
Grease Gun	1
12" Hacksaw c/w 12 spare blades	1
Chipping hammer with shaft	6
1 lb Claw hammer with shaft	1
2 lbs hand hammer with shaft	1
7 lbs sledge hammer with shaft	1
Screw driver 300 mm	3
- 200 mm	3
- 150 mm	3
Galvanized shackles	
- 1 ton S.W.L. (harp)	2
- 2 ton S.W.L. (harp)	2
- 1/4 ton S.W.L. (harp)	2
- 1 ton S.W.L. (harp)	2
Spanner- 300 adjustable	1
Sounding tape	1
Engine Room	
"Allen" key	
Chain Block - 1 ton S.W.L	1 roll
Double sheaves - 1/2 ton S.W.L.	1
Wire brush	6
Electric drill - portable	1
Electric grinder - heavy duty	1
Grease gun	1
Feelers	1 set
Files 6 assorted with handles	1 set
Hacksaw 12" c/w 12 blades	2
Hammer - Chipping with shaft	3
- 2 lbs hand with shaft	2
- 7 lbs hand with shaft	1
Slide calipers - 200 mm	1
Punches (11, 14, 18, 21 mm)	4 each
Plier - inculcate type	1 pair
- ordinary	1 pair
Punches – assorted	1 set
Scissors - 8"	1 pair
Scrapers - 3 assorted bearing	1 set
- 3 paint	1 set
Screw driver - three assorted	1 set
Sounding tape	2 nos.
Thermometer	2 nos.

Description	Qty.
Deck	
Vice - 150 mm	4
Work bench – steel	1
Clock	1
Tool box, steel	1
Socket box wrench	24 pcs
Double end open spanner	16 Nos. (from 3/8 to 1 ^{1/2})
Double end ring spanner	16 Nos. (from 3/8 to 1 ^{1/2})

All tools must be from EU countries/USA/Australia/Canada/Japan.

B-6. ELECTRIC NAVIGATION AIDS & HYDROGRAPHIC EQUIPMENT

6.1 Echo Sounder (Digital Depth Indicator):

The equipment shall be new, unused, high quality and current commercial design & technique. It shall be made of components that will be supported by vendors at least ten years. The equipment and materials shall be suitable for operation under the environmental condition of Bangladesh. The equipment shall be maintainable in the field to the lowest replaceable unit by local personnel. The equipment must be light weight, robust, accurate and in waterproof enclosure and corrosive resistance. All parts and accessories of the equipment shall be free from manufacturing and/or material defect such as breaks, cracks, dents, deformation etc. when delivered at the place of destination. The equipment shall be fitted with the vessels. The transducer shall be hull mounted & provided in a watertight compartment in the bottom.

Labeling:

For equipment and all major components nameplates from original component manufacturer shall be attached and nameplates shall bear mode, serial numbers, year and place of manufacture, safety warnings and any other information critical to the component.

Codes and Regulations:

The equipment to be supplied under the specification shall be designed, built and equipped in conformity with the international standards, codes and regulations.

Spares:

The equipment shall be supplied with spare parts, component and assemblies adequate for three years consumption. The spare parts must be listed & priced individually and the spare parts price must be included with the quoted price.

Tests and Acceptance:

The supplier shall arrange transportation of the equipment/Goods inspection and tests. Tests will be taken in the field (river) around Narayangonj/Chandpur/Aricha. Supplier will, at his cost, assemble/install the equipment and demonstrate their operation. On successful completion of the tests, the Purchaser will issue acceptance certificate.

Maintenance Manuals:

One complete set of maintenance, installation and operation manuals shall be provided for each of equipment. The manuals should have detail and comprehensive circuit diagrams as are required to diagnose and rectify faults. Photographs block schematic circuits and other diagrams shall adequately illustrate the text of each manual. The manuals must be in English language. The maintenance manuals should be adequate for skilled technicians to fully test and repair the equipment by replacing any parts therein.

The Goods and related services shall comply with following Technical Specification as minimum-

Name of Item/Related services	Technical Specification
Type	Single Frequency Hydrographic Survey Echo-Sounder
Unit	Feet or Meter (User selectable)
Depth Range	0.5-150 Meter
Frequency	200/210 KHz
Required Power	11-30 VDC with polarity protection
Accuracy	1cm±0.1%depth
Depth Resolution	1cm
Depth range selection	Auto and Manual (User selectable)
Printer	Should be high resolution thin film thermal printer capable of printing depth, time, fix number, position, scale and other parameters of the chart.
Scale Line	Should be noted automatically at least one set of beginning and ending values which shall be visible in the chart window at all times.
Display	LC Display for digitized depth
Digitizer	Capability of digital signal processing. Digital depth data output through RS/USB/PS ports
Draft Adjustment	0-5 meter adjustable at 1cm steps
Ports & interfacing	BI-directional RS/USB ports should be available for interfacing with DGPS/GPS & PC. The Echo-sounder should accept Data Acquisition Software.
Operator Control	It should have the controls of On/Off, sensitivity, transmit power, chart speed, paper advance, digitized depth, tide/draft adjustment, time and date, manual/remote fix mark command, sound velocity input etc. on the front panel.
Environmental Condition	Operating temperature 0 to 50°C Storage temperature -5° to 55° C Relative humidity 95% non-condensing
Paper Speed	Should have variable chart speed (at least 3 steps) Varied from 1cm/min. to 20cm/min.
Transducer	Inboard/Keel fittings type 200/210 KHz Transducer with all necessary fittings & fixture.
Spare Parts	Spare parts, components and assemblies for three years consumption must be listed separately with unit Price. But the price shall be included with the total quoted price
Accessories	i) Remote hand/foot fix marker, power cable, interfacing cable etc. ii) 25 Nos. Recording Chart Paper roll for each equipment iii) Operational and Technical Manuals iv) Special types tools if any required for servicing
Country of Origin	EU Countries/USA/ Australia/ Canada/Japan

6.2 DGPS receiver:

All equipment shall be latest design & technique, high quality, new and unused. All the components (spare parts) must be supported by vendors for at least 10 (ten) years.

Item No.	Name of item or Related Service	Technical Specification and Standards
1	2	3
Receiver GPS:		
	Type	L1 freq. C/A Code, 12 Channel continuous tracking
	Update rate	At least once per second
	Accuracy	1-5m 2DRMS Position with DGPS $\pm 0.05\text{m/s}$ Velocity with DGPS.
	Dynamics	Velocity: 460 m/s
	Time to first fix	Less than 1 minute with almanac 15 minutes from cold start.
	Reacquisition	5-15 seconds.
	DGPS Input	RTCM SC-104 format, from internal beacon receiver and from external source connected to data port
Beacon:		
	Type	Automatic or Manual tuning.
	Frequency	283.5-325 KHz in 500Hz steps
	Bit rate	200 (auto-syne)
	RTCM Messages Supported	1, 2, 3, 5, 7, 9, 16
Display:		
	LCD	At least 5 inch Diagonal screen, B/W, backlight LCD display.
	Key board Consists of:	i) Function keys: Navigate, Route, Go to, Waypoint, Mark or Event, Plot, Man over Board, Tide, Auxiliary, Position, GPS, DGPS, Configuration, Edit, Clear, Power on/off, Mark position, Day/night view. ii) Cursor key iii) Soft keys.
Antennas:		
	Type	Combined (GPS and Beacon)
	Freq	GPS L1, 1575 MHz Beacon 283.5-325KHz
	Cable length	30 meters (100ft)
Environmental:		
	Operating temperature (CDU)	0 to 50 ^o C
	Operating temperature (Antenna) Storage Temperature	0 to 60 ^o C 0 to 60 ^o C
Power:		
	Type	DC
	Consumption	Less than 10 W
	Supply Voltage	11-30 VDC with polarity protection
	Fuse	Internal over current/over temperature fuse.
	DGPS Status Display	i) Tracking station frequency, ID, and Distance ii) Baud rate, noise and signal strength. iii) Satellite Number (PRN), respective correction and correction are.
	DGPS Station selection	Both Auto and Manual.
	Alarms	Message 16 Alarm, No DGPS data, DGPS Health Changed, Antenna Alarm, HDOP Alarm, No update Alarm, No log data.
	Configuration	Alarm, Datum, Depth, DGPS, Dual control, GPS, Initial position, Lighting, Log, Navigation, NEMA, Operation, Position, Time.

	Language	English.
	Position reference system	Lat/Lon and Grid.
	Datum configuration	Including Bangladesh.
	Display Lighting condition	Quickly switch able between two predetermined display (day time/night time).
Inspection		
	The inspection shall be conducted after installation on crane boat at Narayangonj/Aricha. A five member committee of BIWTA will inspect the goods. All inspection cost will be borne by the supplier.	
Manuals:		
	Operational manual and installation & Service manual will be supplied for each set. Brochure, technical specification of manufacturer and user's manual will be supplied with the tender.	
Country of Origin	EU Countries/USA/ Australia/ Canada/Japan	

Registration & Survey of Crane Boats (with Directorate of Shipping /Mercantile Marine Department of Bangladesh) must be completed by supplier's own cost.

B-7. SPARE PARTS FOR CRANE BOAT

With the vessel complete with engine, equipment, tools, accessories and tools and on board spare parts will be provided & supplied. List is provided hereunder.

7.1 List of SPARE PARTS for 1 No Crane Boat.

Main engine:

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	Cylinder Liner with rubber seal	01 set (1 set=1 No.x No. of Cylinder)		
2	Piston	01 set (1 set=1 No.x No. of Cylinder)		
3	Piston pin	10 nos.		
4	Piston rings	01 set (1 set=1ring group x No. of Cylinder)		
5	Main Bearing	01 set (1 set=1 pair x No. of Cylinder)		
6	Big-end-bearing	01 set (1 set=1 pair x No. of Cylinder)		
7	Thrust bearing	01 set (1 set=1 pair)		
8	Cylinder head gasket	01set (1 set=1 No.x No. of Cylinder)		
9	Exhaust valve	01set (1 set=2 Nos. x No. of Cylinder)		
10	Inlet valve	01set (1 set=2 Nos. x No. of Cylinder)		
11	Insert exhaust	01set (1 set=2 Nos. x No. of Cylinder)		
12	Insert inlet	01 set (1 set=2 Nos. x No. of Cylinder)		
13	Valve spring	10 Nos		
14	Valve guide exhaust	01set (1 set=2 Nos. x No. of Cylinder)		
15	Valve guide inlet	01set (1 set=2 Nos. x No. of Cylinder)		
16	Injector nozzle	01 set (1 set=1 No.x No. of Cylinder)		
17	Plunger barrel for fuel pump	01 set (1 set=1 No.x No. of Cylinder)		
18	Cooling water pump rebuilt kit	01set (2 Nos. for each complete pump)		
19	Complete engine overhauling gasket Kit	01set (2 Nos. for complete engine)		
20	Lub. oil filter	10 Nos		
21	Fuel oil filter	10 Nos		
22	Bolt for connecting rod	10 Nos		

Hydraulic System

Sl. No.	Description	Required Quantity	Unit Price	Total Price
1	High pr. Pipes	12 nos.		
2	Seal for Ram/Boom (different sizes)	12 nos.		

C. CREW HOUSE BOAT

1.0 General

The house boat described herein non-self-propelled boat, outfitted to be utilized as an accommodation vessel. Each house boat shall be of welded steel construction, with diesel generator, enclosed cabins, dinning rooms, galleys, 2 toilets for crew under main deck 1 bath room on the upper deck roof for officers with tiles fitting & fixing etc.

The house boat shall have a complete continuous main deck, below which space shall be sub-divided by five nos. transverse and one no. longitudinal centre line bulkheads.

Deckhouses with provision for accommodation and other facilities shall be on the main deck and upper deck.

Each house boat shall be provided with living accommodations for two officers and twenty six crew members, dining room, store room, galley for crew, diesel Marine Generators of about 30 KVA, color TV, DVD Player & required freeze, necessary furniture, fitting & fixing and bedding accessories along with other usual navigational aids and facilities shall be supplied.

1.1 Principal Particulars

Length O.A (approx)	:	17-20 m
Breadth (approx)	:	6-7 m
Draft (approx)	:	1.22 m
Draught loaded (maximum)	:	1.85 m
Main deck to upper deck	:	2.20 m
Upper deck to roof	:	2.20 m

1.2 Capacity

Fresh water x 2 tank (10 M Ton x 2)	:	20 M Ton
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1.3 Accommodation

2X1	-	Two single Cabin	:	2 Officer (On the upper deck roof)
2X1	-	Two Cabins	:	2 (Master-2 & Driver-1 On the upper deck roof)
2x2	-	Berth Cabins	:	4 Crews on the under deck
5X4	-	Berth Cabins	:	20 Crews on the under deck

Store room, Galley, dining room shall be provided.

1.4 Standard and Workmanship

Scantlings of deck and shell plates and all structural members of the hull and superstructure will comply with this specification. All materials, fittings, equipment etc. will be new, of good quality and free from all defects and be suitable for marine use and standard applicable for vessels of this type.

Workmanship involved will be of good quality conforming to standard shipbuilding practices and construction to be executed and carried out by skilled workers under the supervision of qualified/experienced Naval Architect(s)/Shipbuilding Engineer(s).

1.5 Drawings, Instruction Books

Before work commenced, the supplier will submit to the purchaser of the following drawing. All the drawing will be approved by the classification Society.

- i) General Arrangement plant
- ii) Lines Plan
- iii) Hydrostatic curves and tables
- iv) Stability and trim sheets

- v) Docking plan
- vi) Mid ship section
- vii) Profile and deck plans
- viii) Shell plating.
- ix) Aft ship construction
- x) Fore ship construction
- xi) Deck arrangement plan
- xii) Hatches
- xiii) Air and filling pipes
- xiv) Deck house
- xv) Ventilation arrangement
- xvi) Bulkheads
- xvii) Accommodation plan
- xviii) Pipe diagrams all systems
- xix) Electrical diagrams

1.6 Materials

1.6.1 Mild Steel

All steel plates for the Houseboats will be open hearth or electric furnace processed shipbuilding quality Lloyds Grade-A or equivalent mild steel of uniform surface. Necessary documents including Class Certificates will be submitted.

Best quality steel angles approved by the Purchaser will be used for secondary members such as longitudinal, stiffeners etc.

1.7 Welding

All welding will be of excellent quality. Electric arc welding will be applied to all connections of structural members. Welding of any structural members will only be made after preparing the edges properly as per shipbuilding practice.

1.8 Plating

Deck and shell plating will be welded as per standard shipbuilding practice. Deck, bottom, shell and bulkhead plating will be of 6mm thickness plates. The first roof will be of 5mm and top roof will be 3mm thickness plate. Deck plates will be fitted only after completion of the shell plating except in cases where prefabricated sections are being made for erection.

1.9 Frames and Bulkheads

1.9.1 Frames

All web frames and deck and bottom longitudinal girders will preferably be prefabricated prior to erection. Spacing of web frames will be 1.5m. In between web frames and transverse bulkheads 65x65x6 mm angles will be fitted as side shell stiffeners with a spacing of 500mm.

1.9.2 Bulkheads

Transverse and Longitudinal centerline bulkhead will be fitted. All bulkheads will be of watertight type and preferably be prefabricated. Bulkhead stiffening will be made by 65x65x6mm M.S. angle. Spacing of the transverse bulkhead stiffeners will correspond to the spacing of longitudinal.

1.10 Hatches

Required watertight hatches will be provided in way of the watertight compartments. The construction of hatch covers will be as per standard shipbuilding practice.

1.11 Deckhouse

1.11.1 Crew Cabin

Nine cabins will be made of 4mm M.S. plate to accommodate 26 persons. Two cabins shall be provided for 2 officers each and one double cabin shall be provided for Master-2 & driver-1 on under deck and seven crews cabins will be made to accommodate 24 crews on the under deck of the house boat. The arrangement and the partition wall stiffening and the transverse beams at the deck over these structures will be provided adequately.

The cabins will be paneled by marine plywood all round and ceiling by 6mm. All exposed deck will be insulated with styro foam (50mm thick). Adequate wooden framing (50x15mm) to be made for paneling works. A total of 28 Nos. of wooden bunks will be provided. Coir mattress of minimum 150mm thickness covered with good quality resin will be provided for each bunk.

1.11.2 SSB/Communication Room

The SSB/Communication room of 1800x2000mm of 4mm M.S. plate will be constructed on the top of upper deck.

1.11.3 Crew Mess Room

The mess room of 2050x2000mm of 4mm M.S. plates will be constructed. Other construction and paneling works etc. will be similar to the specification of crew cabin stated above. The position, size and arrangement of the mess room will be as shown in the GA drawing. The mess room is equipped with TV, DVD player, Fridge, Binocular & other necessary furniture and others.

1.11.4 Galley

1 (One) no. galley will be constructed attached to the mess room by 4mm M.S. plates following the construction procedure as stated above.

Provision for sufficient ventilation will be made including one number electric motor driven exhaust fan of adequate capacity.

1.11.5 Store

Two- (2) nos. store of 4000x2000mm & 1325x2000mm of 4mm M.S. plate will be constructed.

1.11.6 Generator and Pump Room

1 (One) no. Generator room 2200x2000 of 4mm M.S. Plate adjacent to the suitable place under main deck.

1.12 Furnishing Schedule

Furniture will be installed as per standard for such ship and as needed for the living personnel. Purchaser's requirements, if there is any will be accommodated.

1.13 Hull fittings, Deck auxiliary and Fittings

1.13.1 Rails and Stanchions

Handrails will be fitted around the weathered portions of the main deck and the upper deck. These handrails will consist of tubular steel top rails, stanchions of steel pipe. The height of the handrails will be about 1.00 meter above deck.

1.13.2 Ladders

Steel Ladders will be provided for access as per standard shipbuilding practice with checkered, footplate.

1.13.3 Doors

All doors on main deck for entering from outside of the deckhouse will be watertight and be made of 4.75mm M.S. plates as per standard requirement. All others doors, such as doors on the upper deck and internal doors will be of flash plywood door.

1.13.4 Fenders

Fenders will be of 200mm diameter of half-circled pipe of thickness of 6mm. Necessary inside gusset and stiffening will be provided.

1.13.5 Chain lockers

Steel floors of shown perforated M.S. plates for storing chain, will be provided with provision of wash and discharge and cleaning of mud. Necessary fixing arrangement for chains will be made. Necessary steel framing by 50x50x6mm M.S. angles will be made.

1.13.6 Windows

Gratings of square size 75mmx75mm made with 6mm dia M.S. rod will be provided as necessary for safety. All window shutters will be made of aluminium framed glass of 4mm thickness.

1.13.7 Capstans

2 (two) nos. sturdy manually operated capstans will be provided as shown in the GA plans. Capstan barrel at the waist, will whelps casted on for efficient warping operation. The mild steel capstan shaft will be of 40mm diameter and stoppers with ratchet mechanism will be fitted at the base for safe operation. Deck plate will be strengthened in way of the capstans.

1.13.8 Bollards and Fairleads

6 (six) double Bollards and 4 (four) Fairleads will be made and fitted as per standard practice of shipbuilding and as shown in the General Arrangement plan.

1.13.9 Deck Strengthening

Deck underside in way of deck auxiliaries and fittings will be sufficiently strengthened for the intended service and to reduce vibration.

1.13.10 Anchor

2 (two) nos. (one for 200 kg. and one for 300 kg.) steel anchors will be supplied.

1.13.11 Chain

2 (two) shackles (27.5m each shackle) of 24mm dia stud link chain will be supplied along with d-type joining Shackle at each end. The chains will have a minimum breaking load of 20400 Kg.

1.13.12 Air Pipes

All the watertight holds will be provided with two air vent of pipes of 100mm dia and will have height of 250mm and will be fitted.

1.13.13 Hawse and Chain Pipe

The dimensions of the hawse and chain pipe will be not less than NB 150mm x 10mm thick and NB 175mm x 6mm thick respectively.

1.13.14 Mast

A steel mast will be erected on the upper deck roof to carry necessary lamp, brackets and a halyard for hoisting flags and spreading antennas.

A galvanized tubular steel antenna post/flag staff will be provided at the rear end of the upper deck roof.

1.14 Painting Schedule

<u>Hull below Waterline</u>		Total DFT (micron)
1 Coat shop primer (compatible to the epoxy)		25
1 Coat coal tar epoxy	Black	75
1 Coat coal tar epoxy	Chocolate	75
1 Coat epoxy enamel	Red	50
<u>Hull till Main Deck</u>		
1 Coat shop primer (compatible to the epoxy)		25
1 Coat high build epoxy	Silk Grey	75
1 Coat epoxy enamel	Light Grey	50
1 Coat epoxy enamel	Light Grey	50
<u>Deck</u>		
1 Coat shop primer (compatible to the epoxy)		25
1 Coat high build epoxy (all area)	Silk Grey	75
1 Coat epoxy enamel (non-slip) (outside accommodation area)	Deep Grey	50
1 Coat epoxy enamel (non-slip) (outside accommodation area)	Deep Grey	50
<u>Superstructure Outside</u>		
1 Coat red oxide primer	Red	25
1 Coat synthetic undercoat	White	30
3 coat enamel	White	60
<u>Superstructure Inside</u>		
1 Coat red oxide primer	Red	25
1 Coat synthetic undercoat	White	30
3 coat enamel	White	60
<u>Hull Compartments</u>		
1 Coat red oxide primer	Red	25
1 Coat bituminous paint	Black	40
<u>Anchor, Chain Capstan, Bollard</u>		
2 Coat bituminous paint	Black	40

International reputed paint must be applied

1.15 Machinery

1.15.1 Diesel Generator Set

A marine diesel generator set will be provided with a continuous rating of not less than 30 KVA at 0.8 power factor, 220 volt, 50Hz., single phase at 1500 rpm. Actual generator rating will satisfy full 220-volt demand load without generator overload. The unit will be of current standard manufacture with spare parts readily available.

1.15.2 Control Panel

Bulkhead mounted control panel will be provided in the generator room having the components as required.

1.15.3 Distribution Panel Board

One A.C and one D.C. power and lighting distribution panel board, located adjacent to the main control panel will be provided. The panel boards will have circuit breakers with ratings and numbers to satisfy system requirements.

The A.C panel board will be rated for 220 volts, single phase, 50 Hz. The panel board will be equipped with feeder circuit breakers to satisfy the A.C. electrical power requirement of the Houseboat.

1.15.4 Pump

1.15.5 Bilge / Wash-deck

One 220V single phase AC electric motor driven self-priming pump will be provided for bilge / ballast/ deck wash. The capacity of the pump will be of not less than 15m³/hr. at a head of abt. 6.0m.

1.15.6 Fresh Water

One (1) no. 220V single phase AC electric motor driven pump of 4.0 m³ capacity against a head suitable for pumping water from fresh water tank in hold to service tank of capacity 2m³ positioned on upper deck roof will be provided.

1.16 Electrical System

1.16.1 Cables and Cable Installation

Ethylene propylene rubber insulated PVC sheathed, cables will generally be used and all cables will have conductors of sufficient load current carrying capacity.

Cables used for AC circuit will be multiple conductor cables.

Cables will be in single continuous length without joins from terminals to terminals.

Cables running in -groups will be supported in metal hangers with provision for watertight glands or stuffing box where penetration through decks or bulkheads takes place.

1.16.2 Lighting and Fans

A complete adequate lighting system will be provided to include fluorescent, ceiling mounted fixtures for interior lighting and incandescent watertight fixtures for exterior lighting. Fixtures for lights will be as per the direction of the Purchaser. Lighting switches will be of marine type and will be mounted for convenient operation. The interior and exterior lighting will be of sufficient number and candlepower capacity as suitable for vessels of this type will be ensured.

Electric wall mounted fans of requisite capacity for each individual person will be provided. Each of the mess rooms will be provided with two bulkhead fans of sufficient capacity and the galley with one ventilator fan.

1.17 Fresh Water, Sea Water and Bilge / Wash deck system.

1.17.1 Piping in General

Pipes, valves, cocks, flanges, etc. will be of such materials, qualities and dimensions as to comply with marine practice and intended purpose. Provision for suitable arrangement will be made in respect of vibration, mechanical damage and passage through bulkheads and decks as well as sufficient number of sectional shut-off valves.

1.17.2 Fresh Water

One gravity tank of 2m³ capacity for supply and distribution of fresh water complete with necessary pipes and fittings will be installed on the upper deck roof and from this tank distribution lines will be led to bath rooms, galley etc. where so necessary.

1.17.3 Sea Water

One gravity tank of 2m³ capacity for supply and distribution of Sea water complete with necessary pipes and fittings will be installed on the upper deck roof and from this tank distribution lines will be led to W/C's, bath rooms, galley etc. where so necessary.

1.17.4 Bilge/ Wash deck / Fire Fighting

A complete piping system including all necessary manifolds, valves and fittings will be provided to allow the pump to function as a bilge pump to drain the bilges of all compartments as well as to function for wash and fire fighting services. Necessary fire hydrants will be placed at suitable positions on every deck to reach every point.

1.18 Navigation Equipment

1.18.1 Navigation Lights

A set of 220V AC navigation lights with control panel, including bow, side, stern and anchor light will be provided in the size and type as required for such vessel to satisfy the requirement of statutory bodies.

1.19 Fire Fighting and Life Saving Appliances.

1.19.1 Fire Fighting Appliances

Fire extinguishers of requisite capacity will be installed outside the galley, generator room, inside accommodation spaces etc. as required by the competent Authority

Fire buckets, fire axe, sand box etc also will provided as required.

1.19.2 Life Saving Appliances

Life buoys and life jackets will be supplied as per requirement of the competent authority.

D. Floating Pipe, Shore pipe and Floater

D-1.0 Floating Pipe

Principal Particulars

Length O.A. (approx) each	: 6.0m
Inner diameter	: 450mm
<hr/>	
Thickness	: 8.00 mm
Materials	: M.S.

D-1.1 General Description

It is the intent of this specification to describe and explain the scope of works and materials required for manufacturing of all welded steel pipes with flange for dredgers. The pipes shall be of simple finish but of quality construction and workmanship such as to ensure smooth surfaces. The construction of steel pipes with flange should strictly comply with this specification.

D-1.2 Measurements

Steel pipes to be made of 8 mm thick steel plate having 450 mm inner dia and 6m in length including flanges of 22 mm thick plate at both ends. There should not be more than one welding joint longitudinally and there should not be more than one joint in circumference.

D-2.0 Shore Pipe

Principal Particulars

Length O.A. (approx) each	: 6.0m
Inner diameter	: 450mm
<hr/>	
Thickness	: 8.00 mm
Materials	: M.S.

2.1 General Description

It is the intent of this specification to describe and explain the scope of works and materials required for manufacturing of all welded steel pipes with flange for dredgers. The pipes shall be of simple finish but of quality construction and workmanship such as to ensure smooth surfaces. The construction of steel pipes with flange should strictly comply with this specification.

2.2 Measurements

Steel pipes to be made of 8 mm thick steel plate having 450 mm inner dia and 6m in length including flanges of 22 mm thick plate at both ends. There should not be more than one welding joint longitudinally and there should not be more than one joint in circumference.

D-3.0 Floater

Principal Particulars

Length O.A. (approx)	:	4.88 m
Inside diameter	:	1.0 m
<hr/>		
Thickness	:	6 mm
Materials	:	M.S.

Steel materials for the Steel Floaters shall be of open hearth or electric furnace process shipbuilding quality Lloyd's Grade - A or equivalent mild steel of uniform surfaces.

3.1 General Description

The Steel Floaters shall comprise of two (2) steel cylindrical floats joined together at both ends by 'U' channels of cross-section 127 x 64 x 6 mm fabricated from M.S. angles at a distance of 2.134 m centre to centre of the cylindrical floats. M.S. angles 76x 76 x 6 mm shall be fastened to the U channel at both ends top and bottom and welded to the end plates.

The end plates shall be stiffened internally with M.S. flat bar 76 x 6 mm and the cylindrical shell shall have longitudinal stiffeners.

Pipe seats shall be made of M.S. flat bar 76 x 6 mm and contoured to be in good contact with outside wall of the delivery pipe. The seat shall be welded to the supper flange of the U channel. Stiffening shall be provided under the pipe seat with M.S. flat bar 76 x 6 mm.

Each cylindrical float shall be subdivided by two (2) No. transverse water-tight bulkheads of M.S. plate 6 mm thick placed at a distance of 1.524 m from each end. Threaded plug holes and plugs shall be provided on each water-tight compartment.

Each floater shall be provided with U-clamp for each pipe seat. The clamp shall be made from M.S. flat bar 76 x 6 mm and bent to half-round shape. M.S. bolts shall be welded at each end of the half-round strap so that they can be secured to the upper flange of U-channel with nuts which shall also be provided by the Supplier.

3.2 Dimensions

a) Cylindrical

Length	:	4.88 m
Inside dia.	:	1.0 m
No. of W.T. bulkheads	:	2
No. of longitudinal stiffeners	:	4
No. of air plugs	:	1 each W/T compartment Total 3 Nos.
Plate thickness	:	6 mm

b) U-channel

Length	:	2850 mm
Cross-section	:	127 x 64 x 6 mm

c) Pipe Seat and U-Clamp

:	:	Suitable for 18" Cutter Suction
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D-4.0 Materials

Steel materials for the steel piped with flange shall be open hearth or electric furnace processed shipbuilding quality Lloyd's Grade: A or equivalent mild steel of uniform surfaces. The manufacturer must produce such certificate to the owner before commencing actual work. The steel pipes, steel plates and the welding joints should confirm to specification.

D-5.0 Welding

Electric arc welding shall be applied to all connection of structural members, the make, type, quality of electrodes are to be approved by a Classification Society and the authorized representatives of the authority. Welding techniques must be approved

by the owner prior to construction. Welding of any structural members shall only be made after preparing the edges properly as per shipbuilding practice.

D-6.0 Painting Works for Steel Pipes

Prior to application of paints, steel surfaces shall be cleaned by scraping and power brushing in order to remove loose scales, rust and dusts etc. The cylindrical pipes are to be painted as per normal shipbuilding practice. Necessary certificate is to be produced from the paint manufacturer confirming quality of paint (marine). After application of each coat, the manufacturer should obtain clearance from the authorized representative of the authority for applying a second coat.

The pipes shall be coated according to the following standard:

<u>Description</u>	<u>Number of treatment</u>	<u>Coats</u>	<u>DF Thickness</u>
Steel Pipes with flange	Red lead primer	x 1	50 micron
	Anticorrosive	x 1	50 micron
	Black enamel paint	x 2	30 micron

D-7.0 Painting Works for Floaters

The Floaters with U-Clamp shall be painted as per normal shipbuilding practice in any of the approved paint schemes. All paint shall be of marine quality and of reputed make approved by the Purchaser. The surface shall be properly cleaned by Sand blasting to bare metal and dried

before applying the priming coat and each coat shall be dry before applying the subsequent coats. A through inspection of the applied coat shall be undertaken to ensure that there is no incidence of flaking, blisters or other flaws before applying the next coat. The paint shall be in sound condition at the time of delivery to the Purchaser.

The paint shall be applied in the following sequence maintaining the dry film thickness given below or the painting operation shall be carried out paint manufacturer's recommendations.

	<u>Area</u>	<u>Number of treatment</u>	<u>coats</u>	<u>DFT</u>
a)	Under water portion	Priming coat	x 1	25 micron
		Anti-corrosive	x 3	25 x 3 =75
		Anti-fouling	x 1	26 micron
b)	Above water portion	Primer	x 1	25 micron
		Anti-corrosive	x 2	25x2=50 micron
		Finish coat (Anti-corrosive Red)		25 micron
c)	Inner surface	Primer	x 1	25 micron
		Anti-corrosive	x 2	25x2=50 micron

D-8.0 Inspection/Test

From time to time inspection by the authority's representative (s) shall be carried out during construction. It will be the responsibility of the manufacturer to obtain approval of the concerned authorized representative (s) of the Purchaser at the following stage of construction:

- a) As and when steel materials and electrodes have been purchased and made available at the yard site;
- b) After edge preparation of plates prior to welding;
- c) After preparation of the surfaces for painting works; and
- d) On application of each coat of paint.

D-9.0 Marking

Each pipe & floater must have the BIWTA marks of non-corrosive marine paint near the two ends.

D-10.0 Liability

Anything not mentioned in the specification but required for safe and worthy construction and usage of the pipes with flange, shall be supplied and fitted by the supplier.

D-11.0 Drawings

Relevant drawings are to be provided for Floating pipe, Shore pipe and Floater.

E. FS Wire

- a) Dia 26 mm (each coil 300 m) -2 Coils

Specification:

Construction of the Rope: 6x19(12+6+1) FC
Normal Tensile Strength: 165 kg/sq.mm
Lay of Wire: Right Hand Regular Lay
Breaking Load (minimum): 35000kg
Grade: A (Galvanized)

- b) Dia 24 mm (each coil 300 m)-2 Coils

Specification:

Construction of the Rope: 6x19(12+6+1) FC
Normal Tensile Strength: 165 kg/sq.mm
Lay of Wire: Right Hand Regular Lay
Breaking Load (minimum): 30000kg
Grade: A (Galvanized)

- c) Dia 20 mm (each coil 300 m)-2 Coils

Specification:

Construction of the Rope: 6x19(12+6+1) FC
Normal Tensile Strength: 165 kg/sq.mm
Lay of Wire: Right Hand Regular Lay
Breaking Load (minimum): 22000kg
Grade: A (Galvanized)

- d) Dia 16 mm (each coil 300 m)-2 Coils

Specification:

Construction of the Rope: 6x19(12+6+1) FC
Normal Tensile Strength: 165 kg/sq.mm
Lay of Wire: Right Hand Regular Lay
Breaking Load (minimum): 13500kg
Grade: A (Galvanized)

- e) Dia 14 mm (each coil 300 m)-2 Coils

Specification:

Construction of the Rope: 6x19(12+6+1) FC
Normal Tensile Strength: 165 kg/sq.mm
Lay of Wire: Right Hand Regular Lay
Breaking Load (minimum): 10000kg
Grade: A (Galvanized)

Country of Origin of all FS Wire: EU Countries/USA/ Australia/ Canada/Japan/China/Korea