F.No.11013/23/2012-(BM-III)/MHA-Prov-I – 115
Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division/Prov.I Desk

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 30th April,2013

To,

Director General
Border Security Force,
CGO Complex, Lodhi Road,
New Delhi.

Subject: QRs/Technical specifications of Floating BOPs.

The QRs/Technical specifications in respect of Floating BOPs as per Annexure have been accepted by the Competent Authority in MHA.

2. Henceforth, BSF should procure the above item required by them strictly as per the laid down QRs/Specifications.

Encl:- As above.

Yours faithfully,

(Smt. S.B.Nanda)
Under Secretary to the Govt. of India
Tel: 23381278

Copy forwarded for necessary action to :-

SO(IT), MHA: It is requested to host the QRs (soft copy attached) on the MHA website (under the page of Organizational Set up- Police Modernization Division-Qualitative Requirements).

(R.K. Soni)
Section Officer (Prov-I)

Copy to: Director (Procurement), MHA.
Copy for information to : PS to JS (PM)

(60)

BOARD PROCEEDINGS

Proceedings of	:	A Board of Officers.
Assembled at	:	Nirman Bhawan, F Block, 2nd Floor, New Delhi.
On	:	22 March, 20, 21 April & 09 May 2011
By the order of	:	HQ DG BSF, Prov Dte (Water Wing) order No.12/861/2010-P/ BSF/WC/384-88 dtd 15/03/2011 & No. 414-418 dated 18/03/11
For the purpose of	:	To prepare Qualitative Requirements (QRs) /Technical Specifications and design of the Floating BOP sanctioned for Gujarat Frontier for deployment in the Creek area..

Composition of the board

Presiding Officer		:	Shri R P Sanwal, DIG (RR), FHQ, BSF, New Delhi
Members	1.	:	Shri S N Jha, DC(WW), FHQ BSF New Delhi.
	2.	:	Shri N C Sunder Singh, AC(WW), Punjab Ftr
Co-opted member		:	Shri Atul Mani Sharma, Principal Surveyor, IRS

In pursuance of the office order No.12/861/2010-BSF/WC/384-88 dtd 15.03.2011 & No. 414-418 dated 18/03/11, the board of officers has assembled to draw Qualitative Requirements (QRs)/Technical Specifications for Floating BOP sanctioned for Guj Ftr.

2. The board of officers has examined existing QRs of Floating BOP and after consulting various boat builders like M/s GSL Goa, M/s MDL Mumbai and other experts and taking into account the suggestions/Board Proceedings received from Field formations and modern equipments/technology available in the prevailing market, the board of officers has prepared the QRs/Specification of Floating BOP and attached to this proceeding as Appendix-"A"(58 Pages)

09.5.11

Presiding Officer : (R P Sanwal, DIG (RR), FHQ, BSF, New Delhi

9/5/11

Member 1. : (S N Jha, DC(WW), FHQ BSF New Delhi

9/5/11

2. : (N C Sunder Singh, AC(WW), Punjab Ftr

09/05/11

Co-opted member : (Atul Mani Sharma, Principal Surveyor), IRS N/Delhi

54

245

0 GENERAL

0.1 INTENT OF SPECIFICATION

The intent of these specifications and accompanying plan is to describe and set forth the design, materials, construction and equipment for a Floating Outpost for Border Security Force for deployment in Inland waters of India, specifically in creek area of Kutch (Gujarat) and Sunderbans of West Bengal.

Technical specification and accompanying General Arrangement Plan are subject to minor changes based on detailed design.

0.2 GENERAL

Details in design, fabrication, installation, inspection and workmanship not covered by shipbuilding industry in the specifications shall be performed as per the standard practice.

Any item in the same context mentioned twice or more in the specifications will be furnished or supplied only once.

If any discrepancy is found between the specification and accompanying plans, the former shall prevail.

Any modification to the specifications will be executed under mutual agreement between the Owner and the Builder, and these will be confirmed by both parties in writing.

Where the word "or" is used in the specifications to indicate that the use of an alternative item will be permitted, it shall be understood to mean 'at the Builder's option.

Whenever the phrase 'or equal' is used, it shall be understood to mean that if any substitution is made, the substitute shall not be of a lesser standard or quality.

0.3 DUTIES

The vessel shall act as the floating base for the flotilla of fast patrol boats. The vessel is to supply Petrol, Fresh Water and provisions to the smaller boats. The vessel shall also have lodging facilities for 37 persons for two weeks. The vessel shall be designed with stowage arrangements for daughter boats and with firing provisions for MMG/LMG on board.

It shall be capable of supporting these auxiliary vessels for a minimum period of two weeks.

0.4 VESSEL PARTICULARS

0.4.1 Principal Dimensions

Length, overall	: 46.00 m
Breadth, moulded	: 12.00 m
Depth, moulded	: 03.40 m
Maximum Draft (Design)	: 1.20 m (approx.)

29/5 9/5/11 09/05/11 9/5/11

Design calculations for intact stability shall be submitted to Indian Register of Shipping for design verification.

0.7 COMPLEMENT

Vessel shall accommodate a complement of 38 persons including operating crew.

The various categories are

Captain	:	01
VIP cabin	:	01
Subordinate officers	:	06
Jawans'	:	30

0.8 BUILD PROGRAMME, DRAWINGS & DOCUMENTS

"The Plans" stated here under in the specifications shall mean those which will be submitted to the owner, such as the contract plans, plans for approval, finished plans and instruction books. All plans, name plates and other documents, which will be submitted to the owner, shall be in English language.

The units used in the plans shall be metric.

Prior to start of construction, the builder shall submit major basic documents/drawings to the owners for approval in due time of design and construction schedule. [All plans and drawings required to be approved by the owner shall be directly sent to IRS, who will do the approval on behalf of the owner.] Owner / IRS shall indicate his comments and approval within 21 days of receipt of the drawings.

The scope of plans for submission for the owners / representatives' approval shall be as follows:

a) Midship Section
b) Deck & Profile
c) Shell Expansion
d) Preliminary Stability Booklet – Intact & Damage
e) Watertight Bulkheads
f) Deck house structure
g) Machinery Arrangement
h) Welding Scheme
i) Accommodation Plan
j) Fire Fighting Appliances Plan
k) Life Saving Appliances Plan

a) General Arrangement Plan
b) Tank Plan & Calibrations
c) Principal Structural sections
d) Profile and Deck plan
e) Trim and Stability Booklet
f) Shell expansion
g) Painting scheme
h) Schematic of main systems
i) Docking Plan
j) Test and Trial Data

0.8.4 Manuals

All efforts shall be made to obtain manuals for the major equipment. Four copies of manuals shall be supplied per outpost bases Kutch (Gujarat) and Sunderbans (West Bengal).

0.8.5 Tools

One set of tools as per the manufacturer's standard supply shall be provided for the equipment. Tool box supplied shall contain ring and open ended spanner in complete set suitable for all the nuts and bolts used in the vessel.

0.9 OPERATION AND MAINTENANCE REQUIREMENTS

Easy accessibility shall be provided as far as possible for operation, maintenance and repair of all equipment, outfit and machinery on board.

0.10 RULES, REGULATIONS & CERTIFICATES

0.10.1 Classification

The vessel, its scantlings and equipment shall be designed and constructed as per Indian Register of Shipping rules to meet the requirements of the notation + IWL Zone I, + IY with descriptive note "Border Out Post". Builder shall provide Certificate of Building from IRS. Any renewal will done at builder cost.

Construction shall be done using approved methods as per Builders Standard Practice.

0.10.2 Certificates

The following certificates and documents shall be obtained by the Builder and furnished to the Owner in triplicate (one original and two copies) at the time of delivery of each vessel.

Builder's certificate

Certificate of Class from IRS

Test certificates for propulsion system, DG sets issued by the Classification Society.

Type Approval Certificates for Navigation lights as approved by IMO and issued by the manufacturer.

Owner's representative shall be informed of the test and trial program. Owner's representative shall attend the test and trials at his cost and risk.

On completion of all test and trials, the results shall be submitted to the owner in the form of a booklet.

0.15.2 Manufacturer's Shop Test

The vessel's machinery, equipment, fittings, etc. shall be tested or inspected or checked before installation on board the vessel at the Builder's yard or the subcontractor's shops or the manufacturer's factory etc. as required by the Classification Society's rules and Builder's or manufacturer's or subcontractor's standard test procedures/schedules.

The tests and trials at the manufacturer's works may be witnessed by the Owner or the Owner's representative.

0.15.3 Onboard, Basin Tests & Trials

Onboard tests of machinery, equipment, apparatus and system shall be carried out after fitting out on board.

When the vessel is nearly complete and all equipment, machinery and auxiliaries have been fitted, a basin trial shall be conducted in order to demonstrate that the machinery fitted is working in compliance with the specifications.

0.15.4 Inclining Experiment

When the first of the series of vessels is substantially complete, except for minor items of work, Inclining experiment and lightship calculation shall be carried out by the Builder in the presence of Owner's and Class representatives to determine the position of center of gravity of the vessel.

The test will be carried out in the Builder's yard, as per Builder's standard practice.

The result of the experiment shall be certified by Owner's representative.

For subsequent vessels of the series, lightship check shall not be carried out if the modification in the design is not substantial. In such cases, results for the first vessel shall be referred to for subsequent vessels.

0.15.5 Sea Trials

When the vessel is substantially completed, she shall undergo sea trials as described below.

Sea trial will be carried out by the builder. Builder shall provide necessary materials and services for the operation of vessel during sea trials.

0.15.6 Trial Condition

Sea Trial will be conducted by the Builder with the vessel floating at a displacement corresponding to the draft at 50% consumable (50% fuel, 50% water, 50% provision, crew and effects) at nearly even keel, in calm sea, with wind not exceeding Beaufort Scale 2 and clean bottom and propeller.

09/05/11

BSF may keep a limited marine crew on board the BOP's while they are in transit so as to acquaint them with the operation of the vessel, its equipment and machinery.

0.18 GUARANTEE

The vessel and all its equipment and outfit shall be under guarantee for a period of 12 months from the date of delivery of the vessel ex-builder's works for quality of material, workmanship and performance.

0.19 MAINTENANCE

Spares shall be replaced by the builder free of cost during guarantee period of 12 months from the date of delivery of the vessel ex-builder's works.

Base and Depot spares for 5 years, shall be provided as per the contract agreement. This shall be ranged and scaled as per Owners requirement after obtaining spares list from manufacturers.

Supervision and maintenance including key technicians for preventive and corrective maintenance support shall be provided by the builder as per the contract.

0.20 ALL INCLUSIVE ANNUAL MAINTENANCE CONTRACT (AIAMC)

After expiry of the Guarantee/Warranty period,the supplier would be under obligation to enter into AIAMC (All Inclusive Annual Maintenance Contract) for 05 years at the rates quoted by the supplier at the time of original bidding.

The AIAMC will include all spares and labour costs etc of repairs, maintenance and over hauling etc of engines and other equipments as recommended by the respective OEMs. It will also include the storing/replacement of fast moving spares/parts and consumable, Anti-corrosion treatment at regular interval as well as repairs and maintenance of propulsion system and painting.

1. HULL STRUCTURE

1.2 HULL CONSTRUCTION

The vessel shall be of all welded type. The main scantlings for the vessel shall generally conform to the requirements of Indian Register of Shipping.

1.2 MATERIAL & SCANTLING

Material of hull construction shall be mild steel conforming to IRS Grade A or equivalent. All materials used for construction shall be of good shipbuilding quality and free from defects.

Scantlings not specified by the Classification Society shall be in accordance with Builders practice.

The bottom and side shell thickness shall be 10% over and above the requirements specified by class considering the extended docking period for the vessel.

1.5.3 Bulkheads

1.5.3.1 Main Bulkheads

Under deck area of the vessel shall be divided into the following compartments by five watertight transverse bulkheads.

a) Aft peak & Chain Locker (C)
b) Machinery Space
c) Jawans'' Common Accommodation
d) PO's Accommodation, Common mess for Jawan / Pos, Galley & Prov. Stores
e) Magazine, Kote (Ammunition Store) & Bosun Stores
f) Fore peak & Chain Lockers (P & S)

Transverse watertight bulkheads shall extend up to main deck and shall be of plane type with vertical stiffeners.

1.5.3.2 Minor Bulkheads

Other bulkheads shall be of plane type welded construction. They shall be of watertight, oil-tight, gastight or non-watertight construction according to requirements.

1.5.4 Transverses & Stiffeners

Frames, beams and stiffeners shall be of standard steel rolled/ built up sections or flat bars.

1.5.5 Keel

Keel shall be formed from a steel plate of width and thickness as required by Classification Society.

1.5.6 Center Girder

A centerline girder dimensioned to rule requirements continuously welded, to run throughout the length of the vessel shall be provided.

1.5.7 Double Bottom

The vessel shall have a double bottom between Aft peak bulkhead and forepeak bulkhead. In peaks single bottom construction shall be followed.

Bottom shell and inner bottom shall be with transverse framing system with solid floors, bracket floors and side girders. Access holes shall be arranged in floors and side girders. Lightening holes shall be provided in solid floors as far as possible without impairing the strength of the structure.

1.5 8 Tanks

The double bottom tanks shall be used for storage of Fresh water, Fuel Oil and Black Water (Sewage holding tank). Fresh water tanks and fuel oil tanks will not be located adjacent to each other.

Petrol tank shall be provided aft of the machinery space below deck. Discharge points for petrol shall be provided on main deck.

1.12 HATCHES, MANHOLES & DOORS

Doors, hatches and manhole shall be provided at convenient locations to provide easy access. Hatches, manholes and doors shall be to Builder's standards.

Soft patch of adequate size be provided to suit the machinery.

Manholes shall be of size 600 x 400 mm and shall have bolted covers. Manhole covers shall be watertight/ oil tight as necessary. The name of the compartment/ tank shall be written on the cover by weld beads.

1.13 ANCHOR STOWAGE ARRANGEMENT

Each anchor shall have anchor pockets to accommodate the anchor and chain lockers to stow the anchor chains. Hawse pipes shall be provided for smooth passage of anchor chains to the cable lifter of the anchor windlass.

Scantling of side shell steel plating adjacent to anchor shall be of increased thickness to account for wear by anchor handling.

1.4 CHAIN LOCKERS

Two (02) off independent chain lockers shall be arranged in fore peak below the main deck port and starboard side. One (01) off aft chain locker will be at center in Aftpeak.

The chain lockers shall have a false bottom of heavy perforated steel plate. The size of chain locker shall be sufficient to have ample capacity and height for stowage of chain cables.

Each of chain lockers will have vertical heavy-duty seamless steel spurling pipe leading the anchor chain from windlass to the cable locker. Spurling pipe to have bellied ends welded with round shape mild steel cope bars to withstand rubbing from anchor chain.

Drainage of the chain lockers shall be by means of a hand operated pump.

1.15 PAINTING

1.15.1 General

NO PAINT SHALL BE APPLIED TO THE FOLLOWING:-

a) Copper, brass, bronze, Aluminium, Aluminium alloy and other non-corrosive metals except where specifically mentioned in the specification.

b) Wooden work in stores

c) Galvanized fittings in hidden spaces and tanks

d) Inner surface of doubling plates and steel surfaces enclosed tightly

e) Internal steel surfaces with deck covering.

1.15.2 Preparation of Steel Surfaces

All plates and sections shall be blast cleaned to SA 2.5. Prior to painting, surface shall be cleaned free from mill scales, grease, oil, moisture, salt etc. Surface shall be coated after

(40)

(g) Exposed internal steel work elsewhere

2 coats of zinc chromate primer yellow	- 50 μ
1 coat of alkyd under coat	- 25 μ
2 coats of alkyd finish	- 50 μ

(h) Oil Fuel Tanks

After thorough internal cleaning the oil tanks shall be coated internally with clean lubricating oil.

(i) Fresh Water Tank

FW tanks shall be coated with fresh water quality epoxy system (Total 100μ) approved for drinking water tanks.

(j) All other areas

All other areas shall be painted as per builder's practice.

(k) Machinery, Piping & Spare Gear

Machinery where not polished shall be carefully cleaned and two coats of oil resisting paint of approved colour shall be applied followed by a coat of clear varnish.

Where necessary pipes shall be painted to standard colour scheme to approval after lagging. Spare gear shall be painted or otherwise protected to approval.

(l) Deck Equipment

2 coats of alkyd finish of same shade	- 100 μ

(m) Wood

Wood shall be treated with varnish.

1.16 IDENTIFICATION MARKS, OTHER MARKINGS AND LETTERING

1.16.1 Ship's Name

On each side of the bow and on the stern, the ship's name shall be marked by letters cut from 6 mm steel plate welded on and painted.

1.16.2 Draught Marks

Draught marks in metric units shall be located at stern and both sides of the stem. The characters shall be cut out from mild steel plates and welded on to the hull.

1.16.3 Key and Tally Plates

Plastic key and tally plates as per yard's standard practice shall be provided.

1.17 CATHODIC PROTECTION

The vessel shall be provided with Aluminium Alloy anodes welded to the hull to minimize the corrosion of the hull. Life span of the anodes shall be five years.

29/5 09/5/11 9/5/11 09/05/11

to the ship structure and pipe bolted to the hangers by pipe clips. Suitable packing material shall be used.

Piping shall be led directly as possible with minimum number of bends and with sufficient joints/flanges to provide for easy maintenance, removal and replacement. Where piping penetrates watertight or oil tight bulkhead, decks or tank, an approved type of bulkhead fitting shall be used. In no case shall there be any plating forming part of joint or piping.

Expansion bends shall be fitted wherever necessary, to prevent damage due to thermal expansion, working of the joint or any other movements of structure. Piping to machinery shall be fitted with approved flexible connections, located as close as possible to the machinery.

Fuel and Lubricating Oil pipes shall be clear of engine exhaust and electrical equipment. No flanges or joints shall be fitted over electrical equipment and no pipes shall be fitted on top of the main switchboard. Piping in accommodation spaces shall be generally behind linings. Where temperature of fluids passing through the pipes is significantly different from ambient temperature, suitable heat insulation or lagging shall be installed.

Soil pipes shall be arranged such that they do not run through the galley or dining hall unless it is impossible to avoid doing so.

At strategic locations and where applicable temperature and pressure gauges shall be installed.

Sea inlets shall be of generous capacity to ensure that the engines obtain an adequate supply of sea water.

All piping systems shall be provided with isolating valves to provide isolation of each unit. Piping shall be thoroughly cleaned before installation and should be securely supported. All pressure gauges shall have loops. Suitable purging arrangement shall be provided in the system. The piping shall be marked in different colors as per Indian Standard.

Flush out pipes towards the sewage tank should be installed with non-return valves.

2.8 PAINTING

All pipes shall be coded with bands in way of flanges and fittings.

2.9 LIFTING GEAR

Lifting lugs shall be provided for pumps and items of heavy equipment which require regular overhaul. A suitable soft patch to lift the auxiliary engines shall be provided.

2.10 INSTALLATION DRAWINGS

A preliminary drawing of the arrangement of machinery and a diagrammatic arrangement drawing of systems shall be prepared.

3. MACHINERY

A rudder-propeller is mounted in square shaped steel well, with a top mounted flange with the help of WT gasket and fasteners supplied by HRP Asia.

Electrical wiring is installed upto a dripwater proof connection box, situated inside the canopy of the unit.

3.1.2 *Diesel Engines*

Technical data

Make
Model
Power & Speed
Cooling System

} Engine of suitable power & capacity of the reputed make and to be type approved by IRS.

The scope of supply for each diesel engine shall be comprised of:

(a)	Sub system	:	Scope of supply
(b)	Engine with	:	SAE 1 flywheel housing with flywheel support brackets fore and aft
(c)	Air intake system	:	Turbocharger engine mounted intake air filter –dry type engine mounted air intake manifold engine mounted vacuum indicator
(d)	Exhaust system with	:	Exhaust Manifold fresh water cooled engine mounted exhaust silencer spark arrestor type flexible connection
(e)	Fuel system with	:	Fuel filter duplex type fuel pump with mvs governor engine mounted fuel shutdown solenoid valve 24 V DC wire braided hose between filter and pump non return valve in supply and return fuel lines flexible hoses for fuel supply and return
(f)	Cooling system with	:	Corrosion resistor engine mounted thermostat fresh water pump engine mounted radiator
(g)	Lubricating oil system, c/w	:	Lubricating oil sump engine mounted Lubricating oil pump gear driven engine mounted lubricating oil cooler fresh water cooled integral with the engine coolant circuit. Oil filling tube with cap for engine oil sump filling Lubricating oil dipstick for lub oil level check engine mounted lub oil filter duplex type by pass filter

3.1.6 Fuel System

A fuel day tank with approx. 700 L capacity is integrated in the engine skid, below the diesel engine. The tank shall be provided with:

a) Filling pipe with bronze cap
b) Dipstick
c) Water drain
d) Vent pipe with flame arrestor to outside canopy
e) Provision to clean the tank

Fuel supply line to the engine is equipped with a de-watering type pre-filter. Connection to the engine is by means of steel wire braided flexible hoses for protection. Sensors are provided for the following:

a) Low level
b) Start fuel pump
c) Stop fuel pump
d) High level.

3.1.7 Exhaust / Air Intake for Main Engine

The exhaust piping is complete with stainless steel exhaust bellows and an 25 db(A) exhaust silencer installed on top of a canopy. The height of exhaust silencer be provided to avoid suction of exhaust air by the radiator fan.

The exhaust piping inside canopy shall be fully insulated. Intake filters for combustion air are mounted on the diesel engine inside canopy.

3.1.8 Electrical System

The electrical system installed in SRP units is 24V DC insulated from the ground. It shall be fed from engine mounted alternator with built-in voltage regulator. 24V DC, Starter batteries with a capacity of 180 AH are mounted in a battery frame inside the engine canopy.

Emergency 24V DC power to ensure the operation of emergency functions is obtained from the opposite SRP units or ship's source.

3.1.9 Steering and Speed Control System

An Electronic Control Unit comprising a drip waterproof box in which the PCB's are mounted for proportional Follow-Up steering. Relays and time-switches are provided for the control of the clutch. The system has built-in protections for over-and under voltage (operating range 20 – 28 Volt DC). Alarm contacts for power failure are provided in the system. The front door of the ECU is provided with:

a) Push –buttons for local steering control (non Follow-Up)
b) Selector switch local/remote control
c) Indication lamps for 'local control mode', built in the push buttons

Wiring from all electrical components on the thruster is completely installed to the ECU.

n) 2x1 Dimmer for illuminated instruments

o) Wiring up to central terminal

3.2 MAIN D.G. SET

Keeping in view too much variation in electrical load demand during various phases of duty cycle, the vessel is provided with three nos. 65 KVA marine diesel generator sets of reputed Indian makes like Kirloskar, Greaves, Cummins, Volvo etc.

In normal seagoing mode or at anchorage (BOP Location) mode, two DG sets will meet electrical demand of the vessel at about 80 % of rated capacity.

When the vessel is in maneuvering mode with windlass into operation two DG Sets will be put into service.

The prime mover for main generators shall be water cooled, four-stroke, non-reversible turbocharged or naturally aspirated marine diesel engine developing the required power. The auxiliary engine and alternator shall be coupled together via suitable coupling to avoid torsional vibrations. The diesel engine and alternator shall be mounted on a common base-frame.

The D.G. sets shall be water cooled with water supplied through tapping taken form sea main line of the ship.

3.3 MACHINERY SYSTEMS

3.3.1 Fuel Oil System

Fuel oil Transfer System

The fuel oil transfer system shall be fitted with one electrically operated screw pump of capacity 2.5 Cu.m/Hr @ 2.0 bar. Pump suction side shall be connected to each main storage tank and delivery side @ 200 litre capacity to daily service tanks in engine room and ME fuel oil sump tanks on main deck. Fuel oil filling connection shall be arranged on main deck port and starboard, with a flanged connection to suit the hose of the bunkering jetty. The necessary filters to ensure a supply of clean fuel to the main engine shall be provided. The pumps shall be fitted with pressure gauges and relief valve.

In addition to this, one semi-rotary hand pump of capacity 50 LPM @ 15 MWC shall be provided for emergency fuel transfer duty in engine room and for fuel supply to the main engine sump tanks on main deck from the fuel main.

3.3.1.1 Fuel Oil System for ME and AE

Each of main engines shall draw fuel supply line from its integral sump tank provided below crank-case. The excess fuel from fuel oil injector pump shall be returned to the respective fuel oil sump tank of the engine.

Fuel shall be supplied to auxiliary engine from fuel oil daily service tanks. Port and starboard daily service tanks shall be interconnected by fuel main to facilitate supply to any aux. Engine from either tank.

Fuel shall be delivered to the auxiliary engine from the FO daily service tanks via quick closing remote controlled valves. Each auxiliary engine's fuel feed pump shall deliver

30

3.3.5.2 For Auxiliary Engine

The auxiliary engine shall be turbo-charged or naturally aspirated. The exhaust gas shall be led to atmosphere through heat insulated exhaust pipes and silencers fitted inside machinery space / funnel.

3.4 SHIP'S PIPING SYSTEM

3.4.1 Air Sounding and Filling System

All air, sounding and filling pipes shall be installed as per standard shipbuilding practice. Void spaces and fresh water tanks shall be vented by goose neck air vent. They shall also act as a overflow pipe for fresh water tanks. Fuel oil and lube oil tanks shall be vented by Ball type vent valves. Filling station with spill coaming shall be provided on main deck for fuel oil bunkering lines.

Sounding pipe shall be provided for all tanks. The pipes shall be arranged as vertical as possible and shall terminate flush with the deck and fitted with brass plugs engraved in Roman and English with the tank number of purpose. The head of sounding pipe shall be of screwed brass caps. Size of sounding pipe shall not be less than 40 mm.

Striking pads shall be fitted below the lower end of each sounding pipe.

3.4.2 Bilge System

Bilge system shall be served by two nos. centrifugal, self-priming, fire, Bilge and GS pumps of capacity 25 Cu.m/Hr @ 35 MWC.

A normal bilging system incorporating necessary valves, mud/strainer boxes and valve chests to serve machinery spaces bilges shall be provided.

Void spaces, Aft Peak spaces and Bosun Store shall be provided with suitable number of bilge suction points. Each suction point shall be provided with suction funnel and a foot valve with a strainer. Bilge pipelines shall be led to suitable location on the main deck with blank flange for semi-rotary hand pump connection for overboard discharge. 3 Nos SR Hand pumps of 50 LPM @ 15 MWC shall be supplied for the purpose.

3.4.3 Fire Main System

The fire main system shall be served by either one of pumps specified at 3.4.2. Branch lines from fire main lines shall also be led to Sewage tank washing nozzle, on the upper deck. 65mm isolating valves with 65 mm instantaneous female coupling connection shall be provided as necessary for the service, washing decks. At each fire hydrant, a hose length of 15 meter shall be provided. Each hose shall be fitted with 65 mm male instantaneous coupling at one end and spray/jet type nozzle at other end. Complete assembly of hose length and nozzles shall be stored in a box fitted near each fire hydrant. Adequate no. of fire hydrants shall be provided for exposed decks, living quarters, Machinery Space and aft peak.

3.4.4 Fresh Water System

Fresh water system shall consist of two fresh water pumps with auto start / stop arrangement (1 working, 1 standby) of capacity 3.0 cu.m/ hr. @ 20 MWC. Fresh water shall be distributed to toilets, sink in day room, windscreen washing water jet, and

09/05/11

Compartment	Type of Fan		capacity	Qty. nos.
Jawans" accomm. on TANK TOP		E	-do-	04(2 each front and astron)
Galley		E	-do-	01
Magazine & Kote		E	-do-	01
Common mess		e	-do-	01
Recreation room		e	-do-	01
Crew & SO's toilet	S		-do-	01
Captain's & VIP's attached (mdk)		E	-do-	02
WHEELHOUSE	S		-do-	02

Natural air supply for Magazine and Bosun Store shall be through hatches / cowl vents on the upper deck.

3.6 AIR-CONDITIONING MACHINERY

In order to have ease of operation, simplified maintenance and economy of electric power consumption on board BOPs individual split type / window air-conditioners will be provided for officer's Cabins, VIP Cabin, Officer's Mess & wheelhouse as follows: -

Compartment	Type & capacity of air-conditioner	Qty.nos.
Captain's cabin main deck stbd	1.5 TR split a/c	1
VIP cabin main deck port	1.5 TR split a/c	1
Officers' mess main deck	1.5 TR split a/c	1
Wheel house	1.5 TR split a/c	2
SOs" cabin	1.5 TR split a/c	3
Jawans" Accommodation	1.5 TR split a/c	8
Common Dining room	1.5 TR split a/c	4
Recreation room	1.5 TR split a/c	2
BOP Comdr Cabin	1.5 TR split a/c	1
Communication room	1.5 TR split a/c	1
Note : all a/c UNITS to have rotary compressor		

SHIP'S OUTFIT

4.1 DECK MACHINERY

4.1.1 Anchor Windlass

The vessel shall be provided with total 03 Nos. Electrically operated anchor windlass, each with capacity to give line pull of 24 KN at a speed of 10m / min and 12 KN at a speed of 20m / min) 720 / 1440 R.P.M. input speed of electric motors.

Anchor windlass shall be duly tested and stamped by IRS at supplier's works before delivery. The forward and aft 02 Nos each Windlasses will be mirror opposite units with warping drum on outboard side.

Each electric motor driven windlass will be comprised of:-

a) One (01) off M.S. fabricated totally enclosed stress relieved splash lubricated helical / spur reduction Gear Box with gear and pinions of suitable rated steel having machine cut teeth, high speed shafts mounted on antifriction bearing and main shaft on bronze bushes with grease / oil lubrication. Gear Box will be fitted with inspection cover, Oil inlet cum breather, Drain plug and Oil Level Indicator.

b) One (01) off cast steel gypsy suitable for 24 mm diameter CC2 Grade stud link chain (as per IRS rules) suitably lined with bronze bushes and mounted on main shaft.

c) One (01) off cast steel warping head fitted with keys at outboard end of Anchor Windlass.

d) One number main shaft material En-8/En-9 thoroughly machined.

e) One (01) off dog clutch with engaging & disengaging arrangement for gypsy.

f) One (01) off chain reliever M.S. fabricated mounted on the under base.

g) One (01) off manually operated band brake adequately rated with class approved make brake lining.

h) One (01) off M.S. fabricated pedestal fitted with bronze bushes.

i) One number slipping clutch suitably rated with brake lining.

j) One number M.S. fabricated under base on which gearbox along with motor, pedestal etc. are mounted.

k) One (01) off chain stoppers suitable for 24 mm diameter CC2 Grade stud link chain.

l) One (01) off marine duty two speed electric motor capable of giving above mentioned line pull at input speed of 720 / 1440 R.P.M. Electric motors shall be IRS approved marine duty TEFC induction motor with IP-56 protection, class F insulation, duty rating of S2 – 30 minutes, suitable to work on 415V, 3 Ph, 50 Hz electric supply. Motor will be fitted with slip clutch on driving end & electromagnetic brake on non-driving end of motor.

(24)

speed boats etc. Height of the railing shall be 1000 mm above deck. Stanchions shall be spaced 1.50 m apart. However, all rails and stanchions should meet classification society requirement, wherever applicable.

4.2.2 Fenders

Tyre fenders of about 1 m dia. shall be provided at classification society intervals along the sides of the vessel.

4.2.3 Mast

A suitable mast of adequate strength shall be provided on the wheelhouse top which will house Masthead light, NUC lights, Anchor light and ensign staff. Provisions for Navigational shapes shall be provided on the mast.

4.2.4 CRADLE

4 Nos Cradle with boat securing arrangement is suitably designed for daughter boat's hull and welded on the main deck in the suitable place and direction so that the davit can lift up and place the daughter boat.

4.3 LIFE SAVING EQUIPMENT

Life Saving equipment approved by SOLAS shall be provided. The daughter speed boats shall also be considered as life-saving equipment.

Item	Quantity
Buoyant Apparatus (12 person capacity)	2 Nos.
Life Buoys	2 Nos.
Life buoys with lines	2 nos.
Life Buoys with lights & Smoke Signals	2 nos.
Life buoys with Self-Igniting Lights	2 nos.
Life jackets (SOLAS Grade), foam type	40 nos.
Distress signals	1 set
Line throwing apparatus	1 no.
Boat hooks	2 nos.
First-Aid Kit boxes with medicines (Deluxe size)	1 no.
Lifeline	2 nos.
Stretcher (Neil Robertson with lifting harness)	1 no.

4 Nos. Electrically operated single arm davits shall be provided on the main deck to facilitate handling of the "daughter" speed boats. The davits shall be fixed type welded/bolted to the foundation on deck. Arrangements to stow the four boats on main deck shall be provided.

09/05/11

09/05/11

09/05/11

Item	Qty	Location
Sand box with scoop (Capacity 0.075 cum.)	1	In Machinery space

4.5 HATCHES AND MANHOLES

4.5.1 Hatches

Access hatches and deck openings shall be as shown on the GA plan. The following weathertight hatches with 150 mm coaming shall be provided for access to under deck spaces.

a) Fore peak/ Bosun Store Hatch
b) Machinery space escape hatch
c) Crew accommodation escape hatch(additional hatch should be provided as there is open type window in under main deck)
d) Hatch to Magazine and Kote

Hatches shall be with a clear opening of 700 x 700 mm.

Hatch covers shall be of steel and hinged type and fitted with synthetic rubber gaskets and clampings.

4.5.2 Manholes

Oil tight or watertight manholes shall be fitted on deep tanks, void spaces, etc. One manholes just above the valve attachments of sewage tank and flush out of toilet to be provided.

Size of manholes shall be generally 600 x 400 mm.

Manhole covers shall be of steel plate and fitted with synthetic rubber gaskets and fixed with steel stud bolts and nuts.

4.6 WINDOWS, SCUTTLES & DOORS

4.6.1 Windows & Scuttles

Two of wheelhouse side windows shall be partly fixed and partly open-able type.(Opening outwards, top hinged with locking from inside). Other wheelhouse windows shall be fixed type. The center window shall be fitted with clear view screen and rest of the front windows shall be fitted with wipers. Accommodation windows shall be open-able type outwards. (Side hinged L.H. & R.H. opening welded windows as per Table 9 of IS 8886 part1)The below main deck cabins shall be provided with fixed scuttles with additional ventilation system.

Window curtains shall be provided for each rectangular window in cabins and public spaces.

Window and scuttle sizes shall be as follows:

a) Wheelhouse windows - 1100 x 800 mm Nominal Size, 15 Nos.
b) Accommodation Windows- 400 x 560 mm Nominal Size, 9 Nos.

Free standing partition bulkheads shall be made of 20 mm thick panels laminated on the visual side. BOP commanding officer's partition shall be half height glass paneling.

4.9 CEILINGS

Ceiling shall not be provided in galley and provision store. Other living spaces shall be provided with 6mm thick panels with lamination on visual side.

4.10 FLOORING

Tefrotex 60L underlay and PVC tiles are provided in non-wet area. Tefrotex 60L underlay and ceramic tiles are provided in wet area.

Sanitary spaces, Provision store, galley	Ceramic Tiles Nonskid
Crews Cabin, Crews mess, SO's Mess, BOP Office, SO's Cabin	PVC tiles
Captains Cabin, VIP cabin, Officers Mess	PVC tiles
Wheelhouse	Rubber Grating
Showers	Rubber Mats.

4.11 MISCELLANEOUS MARKING

Name plates of rooms, valves, pipeheads, etc., shall be written in English and fitted where necessary. All doors shall be provided with stainless steel name plates. Vessel's Call letters shall be engraved in brass plate and shall be kept in wheelhouse. Inside machinery space, all name plates shall be of engraved brass plate.

4.12 CANVAS COVERS

Canvas covers of waterproof quality shall be provided for the following:-

a) Davit winch drums
b) Anchor winch drums
c) Navigational Equipment
d) Control consoles of deck machinery
e) Magnetic Compass
f) Search Lights
g) Speakers

4.13 WORKSHOP EQUIPMENT

A small workshop shall be provided inside the machinery space. The following equipment shall be provided in the workshop:-

a) 1 No. working table
b) 8-inch Bench Vice with drawers under
c) Standard Tool Box
d) 200 mm wheel size Portable Grinder

- Mess/Recreation Room for Officers with split AC.
- Recreation Room for Jawans' with split AC.
- Captain's Cabin, with attached Toilet / Shower with split AC.
- VIP Cabin, with attached Toilet / Shower with split AC.
- Officers Mess / Recreation Room with split AC.

Bridge Deck

- Wheelhouse with split AC
- BOP Commander office /Signal Room with split AC

5.2 ACCOMMODATION

Bunks shall be arranged in the fore and aft direction as far as possible.

Eight Nos 2000 x 1000 x 100 mattresses of polyurethane foam for officer's bed covered with furnishing cloth of shade approved by Builder shall be provided.

Thirty nos. 2000 x 800 x 100 rubberised coir mattresses covered with furnishing cloth of shade approved by MDL, shall be provided.

5.3 SANITARY AND PLUMBING FIXTURES

All plumbing fixture shall be of reputed ISI approved brand and all exposed metal fixtures, accessories in sanitary spaces shall be chrome-plated brass or equivalent.

Wash basins for use of Jawans' shall be of stainless steel and fitted with running water faucets. Water closets for Jawans' use shall be of Anglo-Indian type made of vitreous china and fitted with flushing valves in water supply. Water closets for officers, VIP and subordinate officers shall be European type made of vitreous china. Water closet seat shall be of heavy plastic.

Showers shall be fitted with chrome plated wall type heads, and soap dishes.

The sinks in galley shall be made of stainless steel and shall be provided with heavy duty water faucets and drainage fittings. The faucets shall be screw opening type.

5.4 WHEELHOUSE

Wheelhouse shall be provided above main deck.

Wheelhouse windows, funnels, etc shall be arranged to have good all round view. All controls shall be in wheelhouse.

Wheelhouse shall be air-conditioned. One wall-mounted fan shall be provided.

5.5 WHEELHOUSE EQUIPMENT

Propulsion Unit controls mounted on the console shall be provided. Navigation compass of approved make shall be provided. The following fittings shall be provided in wheelhouse:-

a) One Marine Clock
b) Electric Whistle
c) Electric Wipers

RICE BOWLS (SS) WITH COPPER BOTTOM	6 NOS.
SS QUARTER PLATES	40 NOS.
SS LADLES	6 NOS.
SS RICE PLATES WITH SERVING SPOON	6 NOS.
SS KNIVES	4 NOS.
SS DONGES WITH SERVING SPOONS	6 NOS.
SS FRYING PAN WITH COPPER BOTTOM WITH SPATULAS	4 NOS.
SS KATORIES	80 NOS.
ELECTRIC KETTLE (2 LTRS)	4 NOS.
SS TABLE KNIVES & FORKS	40 NOS.
SERVICE SPOON	40 NOS.
SS TEA SPOON	40 NOS.
CAFETERIA TYPE TRAY	6 NOS.
SS JUG (5 LTRS)	3 NOS.
SS JUG (2 LTRS)	6 NOS.
SS DRINKING GLASS	40 NOS.
CAN OPENER	2 NOS.
SS THERMOS FLASK(2 LTRS)	4 NOS.
COOKS KNIFE SET	1 SET
CHOPPING BOARD	1 NO.
Dinner set	1 No
Tea set with 12 Nos cup Saucer	1 No
Hot case capacity for 2 person	4 Nos
Thermos/flasks 01 ltr capacity	8 Nos
Drinking glass(glass)	24 Nos
Casserole big size	06 Nos

5.7.3 Provision Store

Provision Store shall be provided below deck near Galley. 4 nos. deep freezers each of about 480-litre capacity shall be provided in the Store. Racks shall be provided for storage of provisions.

Dry provision store shall be provided next to the provision store.

5.7.4 Mess and Recreation Rooms

Officers' mess and recreation room shall have the following:-

Chairs (Moulded plastic)	16 nos.
Book Case	1 no.
Wall Clock	1 no.
DVD player advanced version	1 no.
LED Flat TV- 32 inch	1 no.
Cabinet for TV & DVD Player with drawer under	1 no.
Mirror- large	1 no.
Bulletin cum Notice Board	1 no.
Ash Trays	4 nos.
Wall Mounted Fans	2 nos.
Radio (AM/FM)/Cassette Player	1 no.
Dish Locker	2 nos.
Refrigerator 100 litre	1 no
Wash Basin (SS) with water connection	2 nos.
Sofa, 1800 x 570 mm	1 no.
Sofa, 1400 x 570 mm	1 no.
Doormat	1 no.

5.7.5 BOP Commander Office

BOP Commander office shall be provided with the following:

Flat Top Desk fixed	1 no.
Book Rack/ Cup Board	1 no.
TV Flat 32 inch LED	1 no.
Bulletin Display Board	1 no.
Wall Clock	1 no.
Wall Mounted Fan	1 no.
Desktop PC with Printer	1 no.
Mirror Large	1 no.
Chairs, Moulded with cushions	1 no.
Table Lamp	1 no.
Safe with Combination Lock	1 no.
Door Mat	1 no.

Ash Trays/ Wall Clock	2 nos./ 1 nos.
Wall Mounted fans	1 no.
Locker Safe	1 no.
LED Flat TV 32 inch and DVD player with stand	1 set
Pistol Box	1 no.
Arm Chair	1 no.
Night Reading Lamp	1 no.
Refrigerator 100-litre	1 no.
Bunk Light	1 no.
Carafe Holder (wooden)	1 no.
Blanket double	1 no.
Door Mat	1 no.
Coat/ Cap Hooks	1 set.
Bunk Curtains	1 set.
Almirah wooden	1 No

5.7.6.3 SOS" Cabin

SOs' cabin shall have the following:	
Wooden Double berth (polyurethane mattress & pillow, 2000 x 1000 x 100 mm) and reading lamp	1 no.
Wooden Single Berth (polyurethane mattress & pillow, 2000 x 1000 x 100 mm) and reading lamp	1 no.
Wooden Wardrobes, 380 x 450 x 900 mm	3 nos.
Wooden Desk. 1000 x 600 mm	1 no.
Settee, 1000 x 570 mm	1 no.
Book rack	1 no.
Mirror	1 no.
Wall Clock	1 no.
Ash Tray	2 nos.
Wall Mounted Fans	1 no.
Radio/Cassette Player	1 set
Arm Chair	2 nos.
Notice Board	1 no.
Storage for Small Arms	1 no.
Blankets	3 nos.

15 Litres Plastic Bucket with mug	2 nos.
Soap Dish	1 no.
Mirror	1 no.
Geyser, commercial standard, direct heating and 1.5 kW type	1 no. (5 ltr capacity)

5.7.7.2 Captains Cabin Toilet

Officer Cabin toilet shall have the following:

Water closet (Western Type with flush tank)	1 no.
Wash Basin, Vitreous China	1 no.
Shower	1 no.
Toilet Article Case	1 no.
Paper Holder	1 no.
Towel Hook/ Hanger	1 no.
15 Litres Plastic Bucket with mug	2 nos.
Mirror	1 no.
Geyser, commercial standard, direct heating and 1.5 kW type	1 no (5 ltr capacity)

5.7.7.3 SOs' Toilet/Shower

Each SO's toilet shall have the following:

Water Closet (Anglo Indian Type without flush tank)	1 no.
Wash Basin, Vitreous china	1 no.
Shower	1 no.
Toilet Article Case	1 no.
Paper Holder	1 no.
Ash Tray	1 no.
Towel Hook/ Hanger	1 no.
15 litres Plastic Bucket with mug	2 nos.
Mirror	1 no.
Geyser, commercial standard, direct heating and 3/4 kW type	1 no.(10 ltr capacity)

5.7.7.4 Jawans' Sanitary Space

Jawans'' sanitary spaces shall have the following:

Water Closets (Anglo Indian type)	5 nos.
Showers	4 nos.
Wash Basins, SS	3 nos.
Toilet Article Cases	3 nos.
Water taps close to WC's	4 nos.

09/05/11

6 ELECTRICAL SYSTEMS

6.1 GENERAL

All electrical installation shall comply with the classification Society's Rules and Regulations and the recommendations there of.

The vessel shall have the following electrical supply system:

415 Volts, 3 phase, 3 wire, 50 Hz insulated neutral system for main electrical power

220 Volts, 1 phase, 50 Hz for lighting and domestic equipment

24 Volts DC for emergency lighting and alarm.

6.2 DIESEL GENERATING SETS

The vessel shall be provided with three nos.65 kVA, 415 Volts, 3 phase, 50 Hz, self excited, self regulated, diesel generators (KEC make or equivalent) suitable for marine duty.

At ships seagoing mode two 65 KVA D.G. set shall operate and one generator shall always be available as stand by set.

At BOP location (At anchorage) two 65 KVA D.G. set shall operate and one generator shall always be available as stand by set.

At shore jetty only one 65 KVA D.G. set shall operate.

Generators are not to be operated in parallel and shall be provided with anti-condensation heater.

All generators to be run independently, depending upon the load demand.

6.3 POWER DISTRIBUTION

The electrical distribution system shall consist of a main switchboard and lighting / 220V general distribution boards.

220 volts supply shall be obtained via. two nos.415V/220V three phase transformers each of 50 kVA rating.

In normal case 24 volts DC supply shall be made available through a transformer rectifier unit of 2.0 KVA rating.

In emergency 24 V DC supply shall be provided through Emergency Battery of 250AH rating.

6.4 LEAD ACID BATTERIES AND CHARGING FACILITY

Two nos. Main Engine starting batteries of suitable capacity shall be provided.

Two nos. Aux. Engine starting batteries of suitable capacity shall be provided.

Main and Aux. Engine starting batteries are charged through battery charging circuit of respective engines.

One no. 250AH, 24VDC Emergency Battery shall be provided.

6.9.2 Accommodation Space Lighting

Accommodation spaces shall be provided with 2 x 20 W decorative type fluorescent light / 40 W CFL fitting. In passageways 1 x 20 W cornice type fluorescent light / 20 W CFL fitting shall be provided.

6.9.3 Berth Light

Bunk light, non-watertight and bulkhead mounting type shall be provided for each bunk.

6.9.4 Mirror Light

Fluorescent type, mirror light suitable for bulkhead mounting shall be provided for each mirror.

6.10 EMERGENCY LIGHTING

Emergency lighting shall be supplied from the emergency battery and shall be installed in such a way that escape route from machinery spaces, working areas to the boat station are properly illuminated and also all cabins, recreation room, wheel house etc.

6.11 NAVIGATION LIGHTS

Navigation lights shall be provided as per 'International Regulation for Prevention of collision at Sea' rules. Navigation lights shall work on 24 Volts DC.

6.12 NAVIGATION LIGHT PANEL

Navigation light panel shall feed the navigation lights controlled by MCBs / switch fuse units. The panel shall have two incoming supply feeders through a change over switch. Audio visual alarm shall be provided.

6.13 MOTORS

Generally all electrical motors shall be of squirrel cage induction type and shall be provided with class B insulation.

Generally, motors with IP 44/ IP 54 / IP 56 enclosure shall be provided depending upon the location of the motor. Exposed weather deck motors shall be provided with space heater.

6.14 STARTERS

Motor starters shall be totally enclosed drip proof, direct on line starting type and shall be provided on main switchboard only with remote ON /OFF facility for certain pumps.

6.15 ALARM AND SHUT DOWN PANELS FOR DIESEL ENGINES

Main and aux. engines shall be provided with alarm and shut down panels as per classification rules.

6.16 CABLES AND THEIR INSTALLATION

Generally stranded annealed tinned copper conductor, EPR / Butyl / Rubber insulated, PCP inner sheathed and overall PCP sheathed cables shall be used.

All electrical cables shall conform to IEC 92/ latest recommendations.

7..1.4 VHF/UHF Communication

2 Nos. 20 W Motorola VHF/UHF sets including one stand-by for communication with other BSF vessels, Op's base and speed boats.

1 no. 25 W Mercantile Marine SP Radio set having distress management channel 16 on 156.8 MHz for round the clock listening watch with Naval/ Coast Guard ships.

7.4.1.5 Ni-Cd (Dry Fit Chargeable) Batteries with Charger

18 nos. Ni-Cd batteries along with charger shall be supplied.

7.4.2 Communication Equipment for Speed Boats

The following communication equipment shall be supplied by BSF and shall be fitted on the Speed boats by the shipyard.

2 nos. (One stand-by) Motorola 20 W VHF/UHF sets for each boat for communication with the main vessel and other speed boats.

9 nos. 1-4 W Motorola VHF/UHF hand held sets.

8. ARMAMENT

8.1 GENERAL

Gun mounting provisions for mounting LMGs and MMG shall be provided at five locations.

Four No. LMG stands shall be provided with protective covers of NIJ LEVEL- 3 and two nos. LMG stands shall be provided without protective covers. LMG mountings are provided at two locations on the bridge deck and MMG mounting at one location at the forward main deck.

MMG/LMG's shall be BSF supply. Details of the guns may be furnished by BSF for the builder to finalize the mountings.

8.2 MAGAZINE AND KOTE

Magazine and Kote shall be provided aft of the forepeak bulkhead below main deck as shown in the as fitted GA. Entry shall be possible from crew's accommodation. 1 no. hatch shall be provided for emergency escape.

Following racks shall be provided for stowage of ammunition and arms.

1) Racks for transit boxes - 6 nos.

2) Racks for rifles and cabins - 5 nos.

3) Storewel minor with 3 adjustable shelves - 1 no.

Suitable no. of water nozzles for sprinkling shall be provided for the magazine/kote. The sprinklers shall be supplied from the fire mains. A manual arrangement for start of fire pump based on high temperature alarm obtained using a set of thermostats in the magazine area shall be provided.

9.2 ENGINE ROOM

Hand Hammer 350g,500g & 1 kg (0.35 kg)	6 nos.(2 nos each)
Copper Hammer	2 nos.
Sledge Hammer (1 kg)	2 nos.
Chisel (Assorted)	6 nos.
Files (Assorted) (10")	1 each
Compinalion Pliers 6", 8", 10"	1 each
Adjustable Spanners 150 & 300 mm	1 each
Shifting Spanners 150 & 300 mm	1 no.
Star Spanner for connecting rod nuts	1 no.
Ratchet 35 cm	6 nos.
Funnels various size	As required.
Thermometers	1 no.
Engine room clock	2 nos. each
Screw Drivers (15 & 30 cm)	2 nos.
Pinch Bars	6 nos.
Steel Wedges	1 no.
Inclinometer	1 no.
2 lit. measures	2 nos.
Oil cans (1 & 0.5 lit.)	2 nos.
Oil Feeders	3 nos
Portable hand lamps with 5 m wanderleads and Wire guards	1 no
Electric drill machine 12mm	1set
Ring spanner set	1 set
DE spanner set	1 set
Box spanner set	2 set
Philion screw driver set	1 set complete
Std tool kit for main engine as per OEM recommendation	1 set complete
Std tool kit for D.G set as per OEM recommendation	