



Mazagon Dock Shipbuilders Ltd
Corrigendum No. 02 dated 22.03.2024 to Tender No. 1600001915

Corrigendum No. 02 to Tender No. 1600001915 (E-Tender ID: 2024_MDL_94327_1)
Item: Design, Manufacture, Supply, Installation, Training of External Fire Fighting System for
Yard 16101, 16401 to 16406 of CGP Ships.

Please refer to above mentioned tender hosted on MDL e-portal.

1. The SOTRs attached along with the tender document (Enclosure-1 & Enclosure-1A) and SOTRs attached along with Corrigendum-I are replaced with new SOTRs. Bidders are requested to refer SOTR ref: 3047 ver 3 dated 18.03.2024 for 01 CTS and SOTR ref: 3047 ver 2 dated 18.03.2024 for 06 NGOPVs. These revised SOTRs are attached to this corrigendum. The major change in SOTR clauses are tabulated as follows:

Sl. No.	Clause / Reference	Existing Clause	Amended Clause
1	Section II Cl. 6, b), vii page 35	Material of the pumps should be as follows: Casing: Gunmetal to BS 1400 LG4C / Aluminium-Bronze Impeller: Aluminium-Bronze to BS 1400 AB2 Shaft: Stainless Steel to AISI 316	Pump material shall conform to Class certification and regulation to meet FFV-1 NS notation
2	Section II Cl. 6, c), v page 36	Material: Nickel-Aluminium bronze, swivel housing and spindles in bronze.	Material: Material shall conform to Class certification and regulation to meet FFV-1 NS notation.

2. Tender due date and Opening Date:

	Existing Date	Amended Date
Tender Closing Date	22.03.2024	05.04.2024
Tender Opening Date	26.03.2024	10.04.2024

3. All other tender terms & conditions would remain unchanged.

For MAZAGON DOCK SHIPBUILDERS LIMITED

Rupesh Mane
DM(C-P15B & C.G.P.)



MAZAGON DOCK SHIPBUILDERS LIMITED
(A Govt. Of India Undertaking)

SHIPBUILDING DESIGN ENGINEERING
DOCKYARD ROAD, MUMBAI - 400 010

STATEMENT OF TECHNICAL REQUIREMENTS
FOR
EXTERNAL FIRE FIGHTING SYSTEM

PROJECT	:	01 TRAINING SHIP
YARD NOS MDL	:	16101
CLIENT	:	INDIAN COAST GUARD
DOCUMENT NO	:	3047
ICG HQ REFERENCE / APPROVAL	:	SA/0157/01TS/Engg Eqpt dated 14 Feb 2024
CLASSIFICATION NOTATION	:	+ A1 (E) (Government Service) + AMS NIBS +ACC,FFV1-NS CS-Ready, HELIDK(SRF) by ABS or equivalent of LRS/DNV/GL/BV/IRS/NK

REV.	DESCRIPTION	DATE	AUTHORISED BY
03	PD MAT email dated 18 Mar 2024	18.03.2024	
02	PD (Mat) letter SA/0157/01TS/Engg Eqpt dated 14 Feb 2024	16.02.2024	
01	PD (Mat) letter SA/0157/01TS/Engg Eqpt dated 29 Dec 2023 & VC held with CGHQ dated: 16 Jan 2024	16.01.2024	
0	First Issue	12.12.2023	
	RAVINDRA MANWATKAR CM (D-E) Prepared By	S G SONAWANE CM (D-L&Wn) Checked By	C M VISHWAKARMA AGM/ HOS (D-E) Approved By



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ACRONYMS

CPP	-	Controllable Pitch Propellers
DE	-	Diesel Engine
DER	-	Diesel Engine Room
FATs	-	Factory Acceptance Trials
HATs	-	Harbour Acceptance Trials
HPU	-	Hydraulic Power Unit
IPMS	-	Integrated Platform Management System
MDL	-	M/s Mazagon Dock Shipbuilders Limited, Mumbai
OEM	-	Original Equipment Manufacturer
SATs	-	Sea Acceptance Trials
MCR	-	Machinery Control Center
STW	-	Setting to Work
CGRPT		Coast Guard Refit and Production Team
ICG		Indian Coast Guard



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SECTION I:

INTRODUCTION

1. This General Specifications relate to Design, approval of the equipment by the classification society, Manufacture and Supply of one ship set of Equipment for Project 01 Training Ship (TS) of Indian Coast Guard.
2. Project 01 TS consist of Diesel Engine propulsion system comprises of two propulsion plants, each plant consisting of one Diesel Engine driving a Controllable Pitch Propeller and External Fi-Fi pump through single input and twin output Reduction Gearbox and respective shaft line. Each propulsion plant broadly comprises of:
 - (a) One Diesel Engine of minimum 5000 KW power output.
 - (b) One single input, twin-output Reduction Gearbox with built in thrust block.
 - (c) One set of shafting along with associated components
 - (d) One Controllable Pitch Propeller
 - (e) Propulsion plant support systems (for Diesel engines, Gearboxes, Shafting & CPP)
 - (f) Associated Controls & Monitoring System.
3. Class notation for Training Ship is:
+ A1 (E) (Government Service) + AMS NIBS +ACC,FFV1-NS CS-Ready,
HELIDK(SRF) by ABS or equivalent LRS/DNV/GL/BV/IRS/NK
4. The Supplier should submit the quotation based on the General Conditions & Requirements (GCR) and the Technical Requirement for Procurement of each equipment. Should there be any discrepancies between the GCR and the Technical requirement of each equipment, the technical requirement/ specification shall prevail.
5. The reference list of the equipment fitted in Indian or International Navy / Coast Guard or similar platform such as ocean going vessel, Offshore Platforms and Oil-Rigs to be submitted along with the offer.
6. The Year of production of equipment and system to be of latest manufacture (during or after Year 2023). This is to confirm to the current production standards and should have 100% of the defined life at the time of delivery.
(other than permitted running hours during assembly / acceptance trials)
7. The list of indigenous lub oil / hydraulic oil to be furnished.



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GENERAL CONDITIONS & REQUIREMENTS

1. **Subject:** The general conditions and requirements specified in this chapter are intended to meet the functional requirements of a Training platform with integral helicopter capable for operation in oceans environment and performance of all the ICG charter of duties.
2. **Ship's Basic Particulars:** Project 01 - TS class of ships would be Training ships for cadets. Ship's basic particulars, are indicated below: -

Table 1

PARTICULARS		REFERENCE DATA
Ship's dimensions	Length overall (LOA)	107 m
	Beam (water line)	15.2 m
	Draft (deep displacement)	4.02 m
Ship's displacement	Deep displacement	Around 3300Tonnes
Endurance	At cruising speed of 12 to 15 knots	7500 NM
Expected ship's life		25 Years
Operating profile	Continuous slow speeds	Below 8 knots
	Cruising	12 - 15 knots
	Maximum	20 knots
Unrestricted continuous rating of Diesel engine, at 45 degree centigrade ambient temperature		Min 5000 KW

3. Reference Environmental Conditions:

- 3.1 The equipment shall be suitable for marine applications and achieve specified performance smoothly under tropical marine conditions.
- 3.2 The equipment is to be designed for continuous operation & survival under the environmental conditions specified for ambient conditions as specified table below:-

Table 2

Sr. No.	Design Parameter	Value
(a)	Air Temperature	Minimum of 5 deg C and Maximum of 45 deg C



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(b)	Sea water temperature	32 deg C
(c)	Relative humidity	90% at 35 deg C
(d)	Atmospheric pressure	750 mm of Hg column (1000mbar)

- 3.3 **Seaway Conditions:** Seaway conditions are defined at a sea water temperature of 1 to + 32 Deg. C, Ambient air temperature of 5 to 45 Deg. C and humidity up to 90% at 35 Deg. C. Salinity of water up to 35000 ppm. The equipment shall be capable of efficient and unrestricted operation without any deviation from its normal operating parameters under the seaway conditions, as below:-

Table 3

Operational (up to sea state 7)	
Roll	Maximum \pm 22.5 degree
Pitch	Maximum \pm 7.5 degree
Survival (up to sea state 7)	
List	Maximum \pm 15 degree from vertical (permanent)
Trim	Maximum \pm 05 degree

3.4 **Complement :**

(a)	Officers	12
(b)	Subordinate Officers(SOs)/ Enrolled Personnel(EPs)	95
(c)	Training Staff	
	(i) Officers.	08
	(ii) SOs/EPs	38
(d)	Under Trainee officers	70
	Total	223

- 3.5 **Propulsion Plant Operating Profile:** The ship is to be available for exploitation for minimum of 190 days in a year. Each shaft is expected to clock a minimum of 3500 running hours per year. Operational cycle of the ship will be around 36 months.

- 3.6 **Service life of ship:** The expected service life of ship is 25 years @ 4500 hrs. annual exploitation

- 4 **Ship's Support Systems Supplies:** Following ship's support supplies shall be available for the propulsion system. For electrical supplies, in case of different requirements (voltage/frequency, etc.), the equipment supplier shall provide suitable provision (transformer/converter/UPS, etc.).

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Table 4

Sr. No	SYSTEM	SUPPLIES	REMARKS
(a)	Fuel system	Low sulphur high flash high speed diesel (LSHFHSD)	Indian equivalent
(b)	Lube oil system	Indian equivalent to be indicated by OEM	Indian Oil Ltd HPCL, BPCL equivalent
(c)	Compressed air system	High pressure air at working pressure of 30 bar & 30 cu m/hr. Suitable reduction available for working pressure at 30 bar & 7 bar.	Any other pressure requirement shall be met by the equipment supplier.
(e)	Fresh water system	Fresh water at 3 bar (approx.) shall be provided by ship's fresh water system.	Specific requirements to be indicated by equipment supplier.
(f)	Electrical	415 V AC @ 50 Hz, 3 phase	Any other power requirement shall be met by the equipment supplier.
		230 V AC @ 50 Hz, 1 phase	

5 Noise & Vibration:

- 5.1 Design of the equipment along with its associated auxiliaries/accessories/controls and mounting system, should ensure minimal vibration and noise.
- 5.2 All components of the equipment and accessories are to be designed for ensuring resistance to misalignment due to forces of vibration.
- 5.3 Suitable flexible hoses, bellows and noise reduction clamps are to be used for associated piping connections with the main equipment/auxiliaries.
- 5.5 Specific requirements on Noise & Vibration are to be as per respective equipment Technical Specification for Procurement.
- 5.6 Noise and Vibration levels of the equipment shall meet the classification rules and guidelines.

6 Noise Levels in Machinery Spaces: Permissible noise levels in machinery spaces are to be in accordance ISO-6954:2000.

The noise criteria for the compartments are as follows:



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Sr. No.	Compartments	DB(A)
1.	Machinery spaces	110
2.	MCR	75
3.	Work places	85
4.	Non Specific workshops	90
5.	Bridge and Chartroom	65
6.	Radio Rooms	65
7.	Cabins	60
8.	Dining Hall/Offices	65
9.	Service spaces (galley, pantry)	75
10.	Normally unoccupied spaces	90

7 **Vibration Isolators (Anti Vibration Mounts) :**

- 7.1 For resiliently mounted equipment, the mounting system shall be capable of attenuating the vibrations of the offered equipment within the limit specified in Technical requirement.
- 7.2 The installation and connections of the equipment shall account for the extreme displacements that may occur under loading conditions. Wherever necessary, suitable stops/snubbers shall be provided to prevent excessive motion.
- 7.3 Vibration measurements are to be carried out as per ISO 4868(XII)/latest amendment.

8 **Electrical Equipment Requirements:** General requirements for electrical equipment (including Motors & Starters) shall conform as per attached Annexure – 1.

8.1 **IP Rating for Electrical Equipment:** IP rating for associated electrical equipment enclosure is IP 44. Specific IP rating to be as per Technical requirement in Section II.

9 **Availability/ Reliability/ Redundancy/ Self Sufficiency:** Maximum time required for bringing the equipment to full operational condition while undertaking daily, weekly and monthly maintenance routines, are to be indicated by the equipment supplier.

9.1 Equipment should be robust in design for ensuring high reliability, ease of operation and minimum maintenance.

10 **Documentation:** Various documentation will be submitted by the equipment supplier as per the scope of supply and responsibility. Quality documentation is to be submitted in comprehensive and time bound manner for meeting ship's detailed design and production targets as well as equipment production and delivery schedule. Documentation to be submitted by the equipment supplier are broadly indicated below:

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Table 5

Sr. No.	Documentation	Remarks
(a)	Binding design documentation	For progressing with detailed design, integration & installation.
(b)	(i) Quality Assurance Plan (QAP) (ii) Equipment manufacturing/production documentation (iii) Test and Trial procedure/Reports	For approval by ABS and IRS equipment quality assurance during production and Test & Trial accordingly.
(c)	Equipment STW/HATs/SATs documentation	For preparing installation inspection/Test and trials documentation
(d)	Technical Manuals for equipment operation, maintenance, logistics, etc.	For ship's crew, training and repair organizations.

10.1 All documentation (including documents, drawings, data, reports, manuals, etc.) should be in English language. Dimensional details in the drawings should be as per scale. Technical data and parameters should be in metric units (SI Units).

10.2 Following file/formats would be acceptable:

- (a) Documents, data & reports in MS-WORD/EXCEL, as applicable
 - (b) Data base files in ACCESS
 - (c) Orthographic drawings (2D) in DXF/DWG format
 - (d) 3D model of external topography of the equipment only in AVEVA MARINE/.STP format of max size of 5 MB
- Above drawings/data are to be submitted in soft copies in latest software version.

10.3 Hard documents to be provided suitably grouped (section wise H, E, L, Navigation & Communication etc.) indexed and in moisture proof bound folders.

10.4 **Binding Design Documentation:** Comprehensive list of binding design documentation is to be submitted by equipment supplier, in a structured manner under various levels (I, II & III), along with time schedule. Indicative list (but not limited to) is mentioned below:

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Table 6

Sr. No.	DRAWINGS / DOCUMENTATION
Level I : Submission within 02 weeks of placement of order by Shipyard	
(a)	Technical description on main equipment along-with associated auxiliaries/components with operating principle
(b)	General arrangement drawing of equipment and major sub-assemblies along with footprint in 1:25 or appropriate scale
(c)	Assembly drawings of main & associated auxiliaries/components including:- <ul style="list-style-type: none"> • Main dimensions • Mounting arrangement (including details on shock mounts) • Bolting plan • Position & dimension of all Interface details • Operational and maintenance envelopes • Weights • Materials with their specifications • Centre of gravity & lifting points • Flow rate & direction • Etc.
(d)	Equipment performance data
(e)	Characteristics data, curves, efficiency, etc., related to equipment performance
(f)	Heat emission data
(g)	Equipment support systems functional specifications, as applicable along with schematic drawings (such as starting, fuel, lub oil, compressed air, intake, uptake, cooling, hydraulic, vents/drains, controls/monitoring, etc.) including interfaces with shipboard systems
(h)	Data/details for equipment foundation design and interfaces with ship structure
(i)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable
Level II : Submission within 04 weeks of placement of order by Shipyard	
(a)	Equipment control & monitoring data/details along-with structured list of sensors, signals & instrumentation (including in-built sensors for online health condition monitoring)
(b)	Control & monitoring interface data/details for interface with other propulsion equipment and ship's IPMS
(c)	Electrical specifications & wiring diagrams for associated electrical components, local control panels, etc.
(d)	Detailed definition of all terminal points and interfaces, major terminal box diagram, winding & performance data sheet.
(e)	Noise and vibration data/details
(f)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable



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Level III : Submission within 06 weeks of placement of order by Shipyard

(a)	Installation drawings, with interfaces and tolerances; main equipment along-with associated auxiliaries/components along with seat machining requirement & torque value of bolts which are tightened in situ.
(b)	Equipment alignment calculations and its procedure
(c)	Shipping/Unshipping requirements
(d)	List of special tools, instrument, Handling & lifting gear (including jigs & fixtures), as applicable forming part of deliverables and associated procedure
(e)	Flushing requirements and procedure for equipment and its support systems
(f)	Preservation, re-preservation and upkeep procedure; including requirement of preservatives (oils, greases, etc.) with international or NATO equivalents along with chemical composition and physical properties.
(g)	Vibration Analysis; Torsional, Lateral & Longitudinal, as applicable
(h)	Reliability, Maintainability and Availability analysis
(i)	Failure Mode and Effect Analysis (FMEA) (if applicable)
(j)	Training plan
(k)	Any other documentation, as applicable

10.5 Documentation Associated with Quality Assurance Plan, Equipment Manufacturing & FATs/Test & Trials: Documentation associated with quality assurance plan (QAP), equipment manufacturing and FATs(Factory Acceptance Tests), will be submitted by the equipment supplier in time bound manner, well in advance for approval by the designated classification society.

10.5.1 While preliminary quality assurance & test plan shall be submitted by the equipment supplier along with the technical offer, detailed QAP is to be submitted within 15 days after placement of equipment order, for approval of ABS and IRS class.

10.5.2 Prior to commencement of equipment production activities, equipment supplier shall consult designated Classes and Shipyard/ICG.

10.5.3 Documentation associated with equipment manufacturing would be submitted by equipment supplier progressively in time bound manner, for approval by designated classes.

10.5.4 Documentation associated with equipment FATs procedure shall also be submitted by equipment supplier well in advance in time bound manner, for approval by the designated classification society.

10.6 Documentation Associated with STW/HATs/SATs: Documentation associated with equipment setting To Work (STW)/ Harbour Acceptance Trials (HATs)/ Sea Acceptance Trials (SATs), shall be submitted by the equipment supplier within the agreed time schedule, with designated classification society and Shipyard/ Indian Coastguard.

10.6.1 HATs/SATs documents shall include HATs/SATs schedule, procedure, pre-requisites, data to be recorded, time interval for data recording, formats for data



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recording, safety and precautions to be observed during trials, estimated time of the trials and all other relevant data/information required for the successful completion of the trials.

10.7 Technical Manuals for Equipment (Operation, Maintenance & Logistics) : The technical manuals/documentation pertaining to equipment & its associated auxiliaries/support systems, shall include technical description/information, specifications, drawings, performance data, installation, operational & maintenance requirements, spares & logistics, etc., in systematic, structured & comprehensive manner.

10.7.1 Under operating instructions, pre-starting inspection/checks, starting & shutdown procedures, functional parameters, trouble shooting, fault analysis, precautions, etc. to be suitably covered.

10.7.2 Procedures for undertaking all maintenance routines till the end of service life (for the entire life cycle) (including major overhaul), are to be clearly specified along with preservation/ de-preservation & upkeep requirements (when equipment is not in use, during long refit of ship).

10.7.3 Procedures for setting to work, test & trials of equipment are also to be well documented.

10.7.4 Following technical manuals/documentation (in hard and soft form) shall be provided by the equipment supplier along with equipment supply.

Table 7

Description	Content	Number of copies
Technical Manuals	Technical Description and Operating Instructions Manual	7
	On board Maintenance Manual	7
	Field and Depot Maintenance Manual	7
	Installation and Testing Manual	7
	Parts and Tools Catalogue including CPL & PIL in ILMS/SLMS Format	7
Technical Documentation	Installation Drawings	7
	As fitted Drawings	7
	Applicable Standards Utilised	7
	Test Procedure and Documentation	7

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	Certified Test Reports (FATs, Material Test Certificates, Calibration Certificates, Weight Certificate etc.) & Records (including Type Test Certificate). Class certification	7
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NOTE: 1) Draft copy of the above listed Manuals & Documentations (in hard and soft form) shall be prepared by the supplier and shall be submitted to shipyards for comments & to classification society under copy to MDL/ICG for approval, well ahead of the delivery date of the equipment. Approval on the same shall be given within two weeks of receipt of the Manuals & Documentations complete in all respects & required format.

2) All Manuals & Documentations should be categorised as per the above subject/content description only.

11 Quality Assurance And Testing: Quality assurance and testing requirements, pertaining to this equipment should confirm to standard conditions of quality assurance of ABS and IRS.

11.1 Design Standards: Following rules and regulations as applicable shall be met:

- (a) Nominated Classification Society Class Rules.
- (b) International load line reg. 1966 as amended by Protocol of 1988 and any other subsequent amendments.
- (c) IMO/MARPOL-73/78 reg and any further / latest amendments including MS Act 58 and their rules.
- (d) COLREG 72 and any further/ latest amendments.
- (e) IMO /Anti Fouling System.
- (f) International tonnage 1969 and any further/ latest amendments.
- (g) SOLAS 1992 as amended in 2002 and any further / latest amendments.
- (h) Stability standard as per NES 109.
- (i) Naval Magazine Explosive Regulations (NMER).
- (j) Helo deck Regulation as per IRS Rules and Regulations for construction of Coast Guard Vessels (Ch-5, Section -8) or equivalent ABS/LRS/BV/DNV/GL/NK rules.



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- (k) Superior/higher specifications of standard are acceptable subject to proving and satisfactory trial by Yard.

11.2 During execution of the project, following organizations would be associated for ship design, construction, quality control and Ship trials/acceptance:-

- (a) Design : Shipyard / Nominated Classification society
- (b) Construction : MDL and CGRPT Mumbai, at Shipyard.
- (c) Quality Control : Nominated Classification society
- (d) Ship Trials : Indian Coast Guard/Shipyard/Nominated Classification society.

11.3 **Quality Standard:** Design and production of equipment should conform to the best worldwide engineering practices, for ensuring high quality, reliability, durability, ease of operation and maintenance for meeting the ship's requirements.

11.3.1 During equipment production the equipment shall be subjected to various stage inspections. Equipment supplier shall ensure high quality of production as per approved quality assurance plan. Quality assurance should meet the specified standards and intent of ISO 9001: 2015 (quality management systems) or its latest version.

11.3.2 During equipment production, any deviation to the QAP/finalized specifications/standards shall be brought to the notice of designated classification society and Shipyard/ICG, along with valid reasons and recommended solution, without any compromise on quality, reliability and performance of the equipment.

11.4 **FATs-(Factory Acceptance Trials)(Acceptance Test Procedure)ATP(QAP document)**

11.4.1 In order to verify its correct assembly and operation, each equipment, shall be subjected to Factory Acceptance Trials as per established proven engineering practice. A detailed FATs program and post-test inspections to demonstrate performance characteristics and guaranteed parameters of the equipment shall be prepared and submitted by the supplier for approval.

11.4.2 All the parameters/performance required to be checked during HATs/SATs must be included in the FATs & duly noted.

11.4.3 During Factory Acceptance Trials, the supplied equipment is to be installed on the test bed and operated in the same way as it will be on board the vessel. Any correction applied for different environmental and installation conditions shall be duly notified to Coastguard/shipyard seeking their approval.

11.4.4 The testing installation shall provide for a mounting arrangement of equal

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stiffness as expected one for the ship structure where the unit will be seating.

- 11.4.5 The schedule for inspection, test & trials should be drawn up in such a way that all inspections including component level inspection, trials of subassemblies, etc., should be, as far as practicable performed at the corresponding stage of manufacture. Detailed measurements should be carried out at the appropriate stage of manufacture.
- 11.4.6 Factory Acceptance Trials shall be offered to, witnessed & accepted by ICG reps / Classification Society as indicated in the Purchase order. The FATs shall also be witnessed by shipyard representative.
- 11.4.7 The supplier shall provide a detailed program of workshop and shipboard tests and post test inspection to demonstrate the performance characteristics and the guaranteed parameters of the equipment for approval by the shipyard/ Indian Coastguard, in the technical offer.
- 11.4.8 All defects observed or developed during the inspection/ testing are to be rectified free of cost before dispatch to shipyard.
- 11.4.9 Documentation on equipment FATs procedure is to be submitted by equipment supplier in time bound manner, well in advance for approval by the designated classification society. For conducting equipment official FATs, around 12 weeks advance notice shall be given by equipment supplier to designated classification society/Shipyard/ICG, for participation in FATs. On successful completion of factory acceptances tests, complete FATs report duly certified by the designated classification society, shall be submitted to Shipyard/Indian Coast Guard within 02 weeks' time.
- 11.5 Harbour Acceptance Trials/Sea Acceptance Trials:** On board trials shall be conducted by Shipyard based upon HATs/SATs documentation and ship's trials schedule, which would be planned by shipyard in consultation of equipment suppliers/Trial organizations/Indian Coast Guard. Draft HATs/SATs schedule in accordance to DME 303 D or equivalent International Standards is to be submitted by the firm for concurrence of ICG.
- 11.5.1 During equipment setting to work and HATs/SATs, equipment suppliers shall assist and offer the respective equipment trials for their successful completion. Equipment testing, tuning and any defect rectification during on board trials shall be undertaken by the equipment supplier in efficient and effective manner.
- 11.5.2 HATs/SATs documents shall include HATs/SATs schedule, procedure, pre-requisites, data to be recorded, time interval for data recording, formats for data recording, safety and precautions to be observed during trials, estimated time of the trials and all other relevant data/information required for the successful completion of the trials.
- 11.5.3 Shipyard will prepare test and trial documents, based on the HATs/SATs document submitted by the supplier. The same shall be forwarded to the supplier for their vetting.

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11.5.4 HATs/SATs shall be carried out to the satisfaction of ICG as per approved Test and Trial document.

11.5.5 Noise and Vibration trials shall be conducted as desired by ICG team / CGRPT. Points for measurement of vibration limits shall be indicated by OEM.

11.5.6 Supplier shall offer / assist HATs and SATs of respective equipment and attest the test and trial document forms on their successful completion.

11.5.7 The major/critical parts of the equipment shall be subject to inspections during the post-CST (SATs) dry docking of the ship.

12 **Maintenance & Logistics:**

12.1 Equipment supplier shall ensure high reliability and low maintenance of equipment.

12.2 While equipment maintenance and repair between major overhauls would be carried out in-situ on-board the ship, major maintenance/overhaul would be undertaken ashore by repair organization.

12.3 Equipment design should therefore ensure ease of maintenance and accessibility to important sub-assemblies/components/accessories.

12.4 Suitable provisions (such as inspection windows, etc.) as feasible, are to be made for ease of in-situ visual inspection of important sub-assemblies/components/accessories for routine inspection, checks and maintenance, without dismantling the equipment assembly/components.

12.5 Equipment supplier shall provide maintenance schedules, planned maintenance intervals and procedure for undertaking maintenance of equipment on-board and ashore.

13 **Spares:** Installation & Commissioning Consumable, On-Board Spares, Base & Depot Spares, special tools, test equipment, etc., are to be recommended by equipment supplier, taking into account operational and maintenance requirements of the equipment. Equipment supplier shall submit comprehensive list of all types of spares & tools under appropriate category along with the technical offer. Different categories of spares & tools shall be supplied, in consultation with Shipyard/ICG, based upon ranging and scaling by ICG.

13.1 Documentation for equipment spares shall include Comprehensive Part List (CPL) & Part Identification List (PIL), for meeting ICG's Logistics Management System (LMS)/Ship's Logistics Management System (SLMS) requirements. All details on spares are to be submitted by equipment supplier in compatible format in electronic media.

13.2 **Installation Tools and Commissioning Consumables:**

13.2.1 **Installation Tools:** Special tools, jigs and fixtures & test equipment required for flushing, setting to work, testing & tuning, on-board trials (HATs/SATs) and post CST inspection of critical internal parts and reassembly of the

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equipment and its auxiliary systems shall be supplied. Tools shall be ordered along with the main equipment & delivered along with the main equipment.

13.2.2 **Commissioning Consumables:** The Commissioning consumables (first charge like coolants, greases, special oil, filters, gaskets, refrigerant etc.) shall be included in the scope of supply. Commissioning consumables shall be delivered before STW of the main equipment, tentative schedule of which shall be indicated in the Tender Enquiry.

13.2.3 An itemised list with cost for the same is also to be indicated in the offer to facilitate their procurement in future, if required.

13.2.4 One set of standard tools adequate for undertaking the maintenance onboard should be supplied along with the offer.

13.3 **On Board Spares (OBS):**

- (i) The manufacturer's recommended list of On-Board Spares (MRL-OBS) required for servicing and maintenance, including breakdown maintenance for two years of operation after completion of the warranty period, should be included in the scope of supply. A list of On-Board Spares along with the maintenance schedule is to be submitted. The On-Board Spares and special tools shall cater to all on-board maintenance routines and possible repair requirements. Preservation requirements of On-Board Spares, if any, shall be indicated in the offer. The list of On-Board Spares required for auxiliary equipment/system shall also be indicated in the offer.
- (ii) An item-wise list with cost (in LMS format to be submitted in soft copy in Excel) of On-Board Spares, special tools, and test equipment should be as per Annexure 7.
- (iii) In case of any defect or deficiency observed in OBS while handing over to ship crew, the same may be made good by the vendor without any cost implication.
- (iv) All the above OBS spares are to be duly packed in SPTA (Spare parts Tools & Accessories) boxes. For Preferred sizes and material, Refer Annexure "8".
- (v) The Manufacturer's Recommended List of On-Board Spares has to be recommended based on the likely consumption rate of the spares and on the exploitation pattern of the equipment.
- (vi) The Manufacturer's Recommended List of On-Board Spares has to be recommended based on the likely consumption rate of the spares and on the exploitation pattern of the equipment.
- (vii) Firms quoting lesser Manufacturer's Recommended List of On-Board Spares in terms of range and depth will have to make good deficiencies at their cost without any financial responsibility or liability to ICG/MDL within 30 days of intimation to render equipment operational.
- (viii) A certificate of sufficiency of Manufacturer's Recommended List of On-Board Spares is to be submitted by the firm for 03 years of operation of the ship.
- (ix) The Manufacturer's Recommended List of On-Board Spares should also include the spare conforming to Classification Society rule requirements for the vessel.
- (x) The ICG would have the option to amend the list of OBS proposed by the firm during the TNC of the equipment within the quoted price to ensure its sufficiency, based on its past experience of the exploitation of the same or similar equipment.



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13.4 Five-Year Base & Depot Spares/Comprehensive Part Lists: Base & depot spares are to cover spares requirements for major maintenance/overhaul requirements for **5 years** including two refits.

13.4.1 Recommendation for insurance, on long term storage may be indicated. The firm is to submit Comprehensive Part Identification List (CPIL) and Manufacturer Recommended List of Spares (MRLS) for five years exploitation and maintenance.

13.4.2 Itemized list with cost in editable format along with a copy of the maintenance schedule for the equipment is to be provided in the offer. Itemized list (in LMS format to be submitted in soft copy in excel) of Base & Depot spares should be as per **Annexure"7"**

13.4.3 The B & D Spares shall be procured by MDL on behalf of Indian Coastguard. The B & D Spares shall be ordered at a later date, after ranging and scaling of the Spares done by Indian Coast Guard.

13.4.4 The delivery of B&D Spares shall be prior to the Commissioning of the First of Class Ship. Delivery date for the supply of B & D Spares shall be indicated in the Tender Enquiry

13.4.5 Quotation for MRL-B&D along with part no for five years exploitation with price to be supplied along with the offer with item wise cost.

14 INDIGENISATION / LOCAL SUPPORT: (Applicable to equipment with import content)

14.1 The supplier is to indicate if the equipment is original OEM supply or manufactured in INDIA under license (specifying the import content). The manufacturer is to engage into a co-operation with a reputed manufacturer of similar equipment's in India and accordingly plan for progressive indigenization.

14.2 In this respect, the equipment manufacturer shall confirm that he will be able to authorize priority works at his works and provide the necessary local support as required to meet the ship construction and trial programme and provide the necessary after sale support to the ICG. Future plans for indigenous production of the equipment associated control/monitoring devices and transfers of technology are to be indicated in the proposal for consideration of Indian Coast Guard Headquarters.

15 Product Support: Equipment supplier is to provide product support for ship's life of 25 years. In case the equipment is likely to be obsolescent, the supplier shall notify the Coast Guard with at least two years prior notice, along with valid reasons and recommended solution.

(a) The firm/OEM to submit undertaking to provide product support for minimum period of 25 years from date of delivery of the vessel.

(b) Undertaking for upgrade/currency of software for all equipment min 05 years from date of delivery of vessel. In case of obsolescence within 05 years from date of delivery of the Training ship, the same to be upgraded without any additional cost.

(c) Firm to indicate after sales and product support facilities in India with response time for attending defect and providing spares.

(d) All upgradation and modification carried out on equipment during its life cycle must to be intimated to ICG. Further, any upgradation/modification during guarantee

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period of the equipment same to be included free of cost.

(e) Firm should agree to enter into the rate contract / All-inclusive Annual maintenance contract (AIAMC) with ICG for maintenance and supply of spares.

15.1 Operational Cycle: The operating refit cycle of ship is as follows:

- (a) 1st and 2nd Ops refit cycle – Operation cycle of 24 months followed by a refit.
- (b) 3rd and 4th Ops refit cycle – Operation cycle of 18 month followed by a refit.
- (c) Balance Ops and refit cycle – Operation cycle of 15 month followed by a refit.
- (d) First three refits are short refit (SR) followed by a normal refit (NR). Second NR will be medium repair (MR).
- (e) Short refit is for duration of 04 months. Normal refit is for duration of 05 months and medium refit for duration of 12 months.

16 **Materials:** A component wise material list (with specifications) is to be provided by the equipment supplier. Standard materials for use on board ocean going ships are only to be used. Various materials used shall be in accordance with the stipulated requirements as per international Standard, as stated in the equipment technical specifications. Any deviation from specified materials is to be informed to Shipyard/Indian coast Guard in the Deviation List placed at **Annexure- '2'** with suitable reasons and justifications, subject to the condition that the material meets the requirements for envisaged marine application.

16.1 **A separate declaration stating that no asbestos materials are used in the product is to be submitted along with offer and also post manufacturing during equipment delivery.**

17 **Interchangeability:** Equipment design is to ensure that components and parts having same dimensions and characteristics should be inter-changeable between different units of similar kind in the ship, without affecting the specified equipment performance.

18 **Tally and Diagram Plates:** All major components, including fittings such as valves, cocks, levers, gauges, switches, etc., should be provided with suitable identification tallies for appropriate identification. Tally plates shall be in English language and in SI units. All tallies and diagrammatic plates shall be of SS/ chrome plated. Tallies for safety, caution & warning considerations should be in bold black letters on a fluorescent orange background. Diagrammatic plates indicating details of connections are to be provided / affixed near the terminal box of the motor. Size of tally plates, diagrammatic plates, etc. shall conform to International Standards.

18.1 Arrow marking for direction of rotation of motor shall be provided by supplier. This tally shall be made of SS/ chrome plated and properly secured on the motor.

18.2 Motor details such as HP (kW), Starting Current, Full Load Current, rpm, Insulation, Weight, Maker's Name, Sr. No. of Machine, Year of Manufacturing etc. shall be given in the motor tally plate.

18.3 Danger labels in Red colour with white lettering are to be provided on all electrical equipment operating on 150Volts or higher



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18.4 Motor winding terminals ending at Connection Box shall have engraved tally number.

18.5 The diagram plate, which is fixed on the rear side of the front door, shall have complete wiring diagram of the starter with sub-component identification number. The same identification number shall be engraved on the components fitted on the starter.

18.6 Internal Cable-Cores terminating at the connection terminal strip shall have the same corresponding terminal ferrule no. Fixed / fitted on it.

18.7 Tally of JB/Panel and other equipments internal diagram plate to be prepared by OEM.

18.8 Cable Tallies as per approved system drawing to be prepared by OEM.

18.9 Cable tallies should be supply for both the ends.

19 **Instruction Plates:** Instruction plates listing the starting/shut-down procedure and precautions in brief are to be prominently displayed on the equipment. The Instruction plates are to be SS/ chrome plated. Equipment is to be supplied with a set of instruction plates duly mounted on equipment or supplied loose.

20 **Painting Specification:** Standard painting procedure shall be applicable for suitability for marine environment. Equipment shall be cleaned, degreased and painted with two coats of anticorrosive marine paint & two finish coats. All equipment painting shall conform to CGBR 382 or equivalent International Standards.

21 **Lifting Arrangement:** Equipment components weighing more than 40 kilograms are to be provided with eyebolts/lifting arrangement, for ease of handling/lifting on board the ship or ashore. During transportation/transit of equipment, adequate provisions (such as supports, locking arrangement, jacking, etc.) are to be made for preventing any damage to the equipment & its associated components. Any component requiring special handling shall be clearly marked and appropriate handling instructions shall be provided by equipment supplier. One set of special lifting gear (if any) shall be supplied to shipyard.

22 **Preservation / Conditioning:**

22.1 Equipment supplier is to provide high quality packing for the complete scope of supply along with handling arrangements. The package/container should display clear instructions for stowage, handling, care and accessibility for inspection of equipment preservation condition.

22.2 Equipment shall be supplied with Initial preservation for a period of 12 months for tropical conditions and protected against high humidity. The equipment are to be preserved on delivery as per the standard marine engineering practice. Closing plates/plugs/caps (duly filled with nitrogen gas) are to be provided on all openings.



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22.3 For re-preservation requirements, at shipyard or on board ship beyond initial preservation period, suitable provision is to be catered for by equipment supplier. Equipment supplier shall provide re-preservation & upkeep procedure, preservatives/consumables and technical assistance/supervision to the shipyard, as per requirements (if special equipment/Pumps, hoses, fittings, etc. required shall be brought by the supplier along with them for carrying out the preservation on board the ship.

22.4 In the event of storage getting extended beyond a period of 12 months, re-preservation shall be carried out on 6 month extensions basis. The conditions and cost shall be stated in the offer for further two re-preservation of 6 months. Details of the preservative used (oils & greases etc.) and the procedure for de-preservation and re-preservation, in shop or on board the ship, shall be indicated in the offer.

22.5 Preservation requirement, procedures and schedule for main equipment, OBS and B & D Spares are to be indicated in the offer.

23 **Packing & Shipping:**

23.1 All equipment shall be adequately packed and protected with supports to ensure adequate protection during all methods of transportation. Each unit within a package/container shall be clearly marked in English for identification. The container shall clearly indicate the commodity description with caution marks, weight, size, etc.

23.2 A separate document giving complete details & instruction for storage, preservation, handling & transportation after delivery shall be supplied & a copy must be included with the shipping document. The supplier should indicate the delivery schedule port of embarkation, transport, packing, preservation, insurance etc.

23.3 The instrumentation, sensors and meters etc. which are fitted on the equipment are to be removed from the equipment and shall be staggered delivered according to shipyard schedule in a separate suitable box/packing during STW.

23.4 Following items shall be packed in separate containers/boxes with proper colour coding (with description) & list of their contents in English for their easy identification and traceability:

23.4.1 Deliverables related to Main Equipment (to be marked in green colour).

23.4.2 Deliverables related to Auxiliary Equipment (to be marked in green colour).

23.4.3 Deliverables related to Installation material and Tools related to Main & Auxiliary Equipment (to be marked in green colour).

23.4.4 Commissioning consumables and Tools (to be marked in green colour).

23.4.5 On Board spares and Tools (to be marked in red colour) in SPTA boxes.

23.4.6 Base & Depot Spares (to be marked in red colour).

23.4.7 Documentation (to be marked in blue colour).

23.4.8 The list of actual deliverables against each of the above serials shall be forwarded to shipyards in soft copy (MS Excel format) with required part nos.

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within one week of finalization of PNC in order to detail them in the purchase order.

23.4.9 Packing list should give further breakup of items, wherever particular item is quantified by set.

24 Training :

- 24.1 The equipment supplier is to impart training, to ship's crew, on aspects related to operation, installation, maintenance and repair of the equipment.
- 24.2 For imparting training, complete training package in hard & soft form (including suitable training material, docket, computer based aids, etc.), is to be provided by the supplier to the participants.
- 24.3 Training would be conducted by the equipment supplier at Shipyard/ On-board Ship. Training plan will be submitted by the equipment supplier, along with the technical offer. Training is required to cover the following aspects (but not limited to):

- (a) Design and installation
- (b) Operation and trouble shooting
- (c) Control & monitoring
- (d) Upkeep and routine maintenance
- (e) On board maintenance including major repairs and overhaul.

25 Security of Information: The information contained in this document is not to be divulged to any other firm/third party without the prior permission of the Indian Coast Guard and MDL. Adequate measures are to be taken to ensure safe custody of this document.

26 Warranty:

- 26.1 The equipment along with associated auxiliaries/components shall be warranted by the equipment supplier for the stipulated performance for a period of twenty (20) months from the date of delivery of equipment to MDL or twelve (12) months after planned delivery date (D) (mentioned in subsequent Para) of the ship by shipyard MDL to the Indian Coast Guard, whichever is later. This is to be referred as 'Standard Warranty'.
- 26.2 During the said period, the equipment supplied shall be warranted against any malfunction, defects, material failure, non-compliance to ordered specifications, sub-optimal performance, design deficiency, poor workmanship and quality. Any expenditure on account of equipment malfunction, repair or supply of spares against warranty defects shall be borne by the equipment supplier. If any defective part is required to be taken back to OEM's factory/works (i.e. importing and re-exporting from Country of origin) for the purpose of service, the entire liability including expenditure towards the same shall be borne by the supplier. The spare parts required / consumed for scheduled servicing & maintenance activities in the period of 'Standard Warranty' shall also be provided by the OEM without any commercial implication.



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- 26.3 The Supplier warrants for a period of 12 months from date of acceptance of the Training ship by the Shipyard at the designated Indian port or as applicable, that the vessel and the associated equipment and service supplied under this contract and each component used in the manufacture there of shall be free from all types of defects/failures.
- 26.4 If within the period of warranty, the Training ship and (or) stores and (or) spares are reported by the Shipyard to have failed to perform as per the specifications, the Supplier shall either replace or rectify the same free of charge, maximum within 15 days of notification of such defect by the Shipyard provided that the goods are used and maintained by the Shipyard as per instructions contained in the operating Manual.
- 26.5 Warranty of the equipment would be extended by user in log book, Spares and all consumables required for warranty repairs shall be provided free of cost by Supplier. All activities including diagnosis, rectification, calibration, transportation etc., required for making equipment serviceable and available would be Supplier's responsibility.
- 26.6 The Supplier also undertakes to diagnose, test, adjust, calibrate and repair/replace the goods/equipment arising due to accidents by neglect or misuse by the operator or damage due to transportation of the goods during the warranty period, at the cost mutually agreed to between the Shipyard and the Supplier subject to acceptability by the Shipyard. The Supplier shall intimate the assignable cause of the failures.
- 26.7 Supplier hereby warrants that necessary service and repair backup during the warranty period, shall be provided by the Supplier and he will ensure that cumulative downtime period for the Training Ship and or the fitted equipment /system equipment does not exceed 45 days of the warranty period. Thereafter, the Shipyard reserves the right to make good the defects at suppliers risk and cost.
- 26.8 If the associated equipment and service, spares of Training Ship fails frequently and/or, the cumulative down time exceeds 45 days of the warranty period or a common defect is noticed repeatedly with respect to a particular item/component/sub-component, that complete item/ equipment shall be replaced free of cost by the Supplier within 45 days of receipt of the notification from the Shipyard duly modified/upgraded through design improvement in all equipment supplied/yet to be supplied and Engineering Support Package (ESP) supplied/yet to be supplied. Thereafter, the Shipyard reserves the right to make the defects at Supplier risk and cost.
- 26.9 In case the complete delivery of the ESP is delayed beyond the period stipulated in this contract, then the Supplier undertakes that the warranty period for the goods/stores shall be extended to that extent.
- 26.10 The Supplier warrants that the Training ship, the associated equipment and service supplied will conform to the Temperature and Humidity conditions as mentioned in this document.
- 26.11 The Supplier agrees to provide back to back warranty of equipment /system or any other item whose specified warranty by the OEM is more than 12 months and shall extend the same warranty to the Shipyard at no. additional terms and conditions.

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26.12 **Extension of Warranty:** Supplier shall mandatorily indicate, in the offer, the annual rate for extended warranty period, in the event of expiry of warranty period as detailed above along with the attendant commercial terms and conditions if any.

27 **Planned Ship Delivery date(D):** The planned date for delivery of the Ships to the Indian Coastguard by MDL are tabulated below:

Ship no.	Yard No.	Planned Delivery date
1	16101	October 2026

28 **Weight Recording / Weight Certificate:** Weights of all components are to be recorded and a suitable certificate shall be submitted, by the equipment supplier. The designated inspection authorities shall countersign such certificates. Format for weight control data sheet, is placed at **Annexure '3'** of this document.

28.1 Net weight of each component is to be recorded in presence of designated inspection authority and the weight certificate is to be submitted by the equipment supplier, along with equipment supply. Format for weight certificate, is placed at **Annexure '4'** of this document.

28.2 The supplier shall have to submit, reasons for variation between allocated weight and actual/certified weight for each and every item, wherever applicable, to Coast Guard and MDL for their consideration and further necessary action.

29 **Maintenance Management Software:** A Maintenance Management software package for Ship Maintenance, Planned Preventive Maintenance (PPM), Defect Record & Tracking and Maintenance Forecast & Planning as per CG requirements shall be installed and commissioned.

29.1 The software package shall be capable of indicating Maintenance Routines falling due on various equipment fitted on-board and spares requirement, as per OEM promulgated schedule.

29.2 The software will be capable of interlinking on-board spares with actual spares requirement and indicate future requirement to meet Minimum stock level.

29.3 OEM is required to submit the inputs such as routine schedule, spare requirement etc. in the format enclosed at Annexure-9

30 **Technical Assistance:**

30.1 The Supplier shall provide the necessary representative(s) **as and when required**, in carrying out inspection and supervise the work that is done on the equipment, during the following phases:

(a) Preparation for installation of equipment by shipyard.

(b) Monitoring of proper equipment preservation during storage.

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- (c) On-board erection and alignment.
 - (d) Setting to Work (including fitment of latest calibrated instrumentation).
 - (e) Harbour Trials.
 - (f) Assistance in trouble shooting.
 - (g) Customer Sea Trials
 - (h) Post CST equipment Inspections.
 - (i) Final Machinery Trials.
 - (j) Assistance in operation during equipment guarantee period.
- 30.2 The supplier shall indicate total cost for executing all technical assistance activities mentioned above, in the price bid. Activity-wise cost break up shall also be given in the price bid, to facilitate the payment on satisfactory completion of the activity.
- 30.3 Shipyard has to progress on ship construction activities, simultaneously on ships of the coastguard project or on ships of different projects. View this, there shall be every likelihood of clash of requirement of technical assistance. In such eventuality, in order to avoid delays on one ship due to similar work requirement on other ship, supplier shall depute their dedicated separate/independent team of supervisors/specialists for required technical assistance, on the required ships. Rotation of supervisors/specialist amongst the various ships/projects shall be avoided.
- 30.4 The supplier shall provide checklist for installation, setting to work, HATs & SATs to the shipyards to ensure the completeness of the activities by shipyards in order to avoid waiting period of the supplier specialists.
- 31 **Receipt Inspection:** Receipt inspection for the major equipment shall be carried out in the presence of OEM rep to verify completeness of the scope of supply and intactness of the supplied equipment. Defective / damaged parts and deficiency, if any, in supply shall be made good by OEM free of cost. OEM shall be intimated the date of receipt inspection.
- 32 **Price:** Price bid shall include cost of all deliverables and services as mentioned in tender. Break-up in percentage of total quoted cost of main equipment for its various components shall be indicated by the supplier. Non-indigenous equipment Suppliers are to indicate the import content in USD/EURO.
- 33 **Compliance Matrix:** Para-wise compliance matrix, including paras which are not applicable, as per the technical specifications (contained in this document) shall be submitted by the equipment supplier along with the technical offer, in the format as per Annexure-5 (preferably in excel sheet). The technical offer received without Compliance Matrix shall be liable for rejection.
- 34 **Technical Offer as Per Shipyard Tender:** Technical part of the offer with respect to the equipment and its associated auxiliaries/components/controls, to be submitted by the equipment supplier in comprehensive, systematic and structured manner, as per the requirements mentioned in this document, including the following (but not limited to)

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Vendor to submit the check list as per Annexure-6 :

- 34.1 Equipment specifications.
- 34.2 Equipment performance data
- 34.3 Characteristics data, curves, efficiency, etc., related to equipment performance
- 34.4 Outline general arrangement drawings of equipment with footprint, main dimensions, weights and mounting arrangement, with recommended maintenance space.
- 34.5 Requirement of Ship services (Power rating, Sea/Fresh water, Compressed Air etc.)
- 34.6 Associated support systems specifications and drawings.
- 34.7 Interface requirements.
- 34.8 Relevant drawings with all views and maintenance envelopes.
- 34.9 Control and monitoring system along with complete list of sensors and instrumentation (in structured manner).
- 34.10 Mounting data/details and characteristics
- 34.11 Structure borne and airborne noise performance levels (in graphical & digital format).
- 34.12 Comprehensive list of binding design documentation in structured manner along with time schedule for submission.
- 34.13 Associated electrical equipment specifications and drawings.
- 34.14 Recommended list of installation & commissioning Consumables, onboard spares, base & depot spares, special tools, test equipment, etc., in systematic manner.
- 34.15 Indigenization plan, work-share, MOU / Definitive Agreement / License agreement, technology transfer, product support, etc.; as applicable.
- 34.16 Training plan
- 34.17 Preliminary quality assurance and test plan. (QAP)
- 34.18 Compliance matrix (Para-wise compliance to tender specifications).
- 34.19 Complete Weight breakdown for major components (excluding & including oil).
- 34.20 Requirement of Greases, Oils etc., with their Indian equivalents.
- 34.21 Proposed plan for technical assistance for installation, preservation and commissioning, trials, etc.
- 34.22 List of main and auxiliary equipment included in the standard scope of supply with NCN (NATO Code Nos.).
- 34.23 List of items required for auxiliary systems (shipboard systems), which are essentially, be fitted for proper functioning of main equipment with NCN. Also indicate any of them, which are not supplied along with main equipment.
- 34.24 List of Instrumentation & Diagram.
- 34.25 Clear demarcation between the scope of supply of firm and that of the yard.
- 34.26 Trial and commissioning time of complete system on board.
- 34.27 Delivery time from receipt of order.
- 34.28 List of special tools, instruments, jigs & fixtures & facilities required for lifting, transporting, aligning, installing and commissioning of main equipment and their auxiliaries.
- 34.29 Type approval
- 34.30 The specification relates to design, manufacture, supply & commissioning of System / equipment to be used in Indian Coast Guard Ship.

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- 34.31 Manufactures may be guided by this document to ensure that their products meet the standards of Installation on Indian coast guard ship.
- 34.32 The drawing & dimensions are for reference purpose only. Vendor to design the equipment based on technical data supplied.
- 34.33 The offer should be strictly conforming to the details indicated in this specification and in the relevant specifications / drawings / documents (All Latest Issues are to be followed).
- 34.34 No omission in the Specifications shall relieve the supplier of his responsibility to ascertain these requirements to perform work & furnish material in accordance with codes specified.
- 34.35 The offer should be complete with all relevant details such as Detailed Technical Specification, Material Specification, Overall Dimensions, Maintenance requirement, Foundation / Installation / Bolting, Storage/ Preservation Details, supported by drawings/documents/data sheets etc.
- 34.36 Any clarification required regarding Technical Specification / Requisition should be sought before submission of the offer.
- 34.37 Four copies of technical offer shall be submitted by equipment supplier; in hard and soft form (CD-ROM).

35 INSTRUMENTATION:

35.1. Safety, control and monitoring devices are to be fitted on equipment as per requirement. All Miscellaneous items are to be fitted as per functional requirement of the system. All piping material with necessary instrument & accessories & Instruments are to be fitted.

35.2. Any other instruments & accessories not listed however are required for satisfactory operation as supplier design shall also be part of scope of supply.

35.3. If applicable, 100mm dia. pressure and vacuum gauges (complete with needle valves, nuts and nipples) and thermometers should be supplied for the machinery equipment under supply as per technical, specification and these should be indicated in the installation drawings for the unit. Pressure gauge cocks should be provided with vent holes.

35.4. All the thermometers should be brass cases. Suitable pockets/sockets should be arranged on the equipment for fitting the pressure gauges and thermometers.

35.5. All the pressure gauges and thermometers should be marked in kg/sq.cm or bar and deg. Celsius respectively. All the pressure gauges and thermometers scale ranges should be selected so that the maximum normal operating pressure and temperature respectively will be approx. 75% of the full-scale range.

35.6. Temperature sensing should have the facility to allow for instrument removal without impairing the integrity of the system.

35.7. Pressure gauges should be provided with valve arrangements to allow for instrument isolation and removal, without impairing the integrity of the system.



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SECTION II: TECHNICAL SPECIFICATION

1. DESCRIPTION:

Design, Approval of the complete system by the classification, manufacturing, supply and commissioning onboard ship of **External fire-fighting system** with following characteristic:

- a. Comprising of 02 numbers of ship's gearbox PTO (Power Take Off) driven centrifugal pumps.
- b. Discharge rate per monitor shall be 1200 m³/hr.
- c. Along with 02 numbers dual purpose foam / water monitors, manually and electrically remote controlled operated and fitted with dual outlets, one having a dedicated water branch pipe fitted with spray deflector and the other with a straight jet stream foam branch pipe, venturi type foam liquid proportional, sea suction valves, metering valves, discharge valves and all necessary in-line isolating valves.
- d. Type approved equipment/system by IACS authority to be offered by the vendor along with unit certification from both ABS and IRS.
- e. If Type approval is not available with the equipment/system, class approved equipment/system to be supplied by the vendor (Class Approval by IRS and ABS both).
- f. Along with necessary equipment, valves, system fitting, nozzles, hoses, auxiliaries, controls, alarms, instrumentation, control panel, joystick panel, tools and on-board spares as per latest ABS and IRS rules requirements as applicable for the class of the vessel.
- g. Quantity : 02 Nos
- h. External FI-FI system shall comply the class notation of FFV-1-NS

2. CONFIGURATION OF EXTERNAL FIRE FIGHTING PUMP WITH PROPULSION GEAR BOX:

- a. Propulsion plant of ship consists of two propelling sets, each one including one marine engine driving a controllable pitch propeller through a reduction gearbox. Both propelling sets are independent. Makes and models of main propulsion engine and reduction gearbox will be intimated later. Main Engine is developing approx. 5000 KW to 5400 KW at 1000 to 1300 rpm in tropical condition.
- b. Each Gearbox will be provided with PTO (Power Take Off) drive for each external fire-fighting pump (meeting class regulations) on primary gear train. A rake of approximately 3 degree is provided on shaft line; gearbox and main engine on PORT as well as STBD side, hence external fire-fighting pump on both the sides should be suitable for installation at rake of approximately 3 degree to horizontal. Exact rake angle will be shared at the time of detailed designing of the system. Power rating and rpm required for each external fire-fighting pump to be indicated in the technical





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bid and same will be indicated to gearbox supplier for finalizing the gear train in gear box and fixing the engine rpm during external fire-fighting operation. Accordingly engine rpm, pitch of controllable pitch propeller and combinatory curve of ship's remote control system will be designed by MDL/ Integrator for carrying out external fire-fighting operations.

- c. Multi disc wet clutch and flexible coupling of heavy duty for external fire - fighting pump will be supplied by gearbox supplier. Multi disc wet clutch for external fire-fighting pumps will be integral with gearbox for engaging and disengaging the external fighting pumps. Supplier of external fire-fighting pump should provide all the interface details of the pump for the clutch and flexible coupling between gearbox and pump. Pump sets are to be supplied as complete units ready to be connected to PTO of gearbox. Axial In and Radial Out pump shall be considered. Suitable 90 degree bend should be supplied for bottom suction from sea tube/ sea chest which will be located in engine room itself.
- d. The main engine manufacturer will carry out torsional vibration calculation for the complete propulsion system. However all the relevant torsional data of external fire-fighting pump required for carrying out TV (Torsional Vibration) analysis should be supplied by external fire-fighting pump supplier.

3. GENERAL REQUIREMENTS OF FIRE FIGHTING PUMPS AND MONITORS:

A. EXTERNAL FIRE FIGHTING PUMPS:

- i. All requirements as per the latest rules of classification society (ABS and IRS) should be met; approval should be obtained for items of external FI-FI pump.
- ii. Each External-fighting pumps duty parameters to be indicated:

Capacity	1200 m ³ /hr(Discharge rate per monitor) (As per FFV-1-NS notation)
Total Head	As per the requirement of class rules
Speed	To be indicated in the offer
Efficiency	To be indicated in the offer
Driver rating required	To be indicated in the offer
Pump shaft seal	Mechanical Type (As the pumps are being installed in engine rooms, seals should have high reliability to avoid any leakage)
Sizes of suction and discharge of the pump	To be indicated in the offer
NPSH required	To be indicated in the offer
Maintenance space required around the equipment	To be indicated in the offer

- iii. Independent sea suction will be provided for each fire-fighting pump. Both the fire-fighting pumps should have equal capacity. Running indications of each external fire-fighting pump will be provided by gearbox, as hydraulic clutch is provided with the Gear Box.



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- iv. The direction of rotations of external fire-fighting pumps as seen from pump shaft end (Driving end) will be intimated during detail designing but will be as follows:
 - a. One Pump will be Clockwise and the other will be Counter-clockwise. Pump shaft shall be protected from liquid and is to be encased in grease lubricated ball bearing housing to form integral part of pump casing.
- v. End connections of the pump should be circular size confirming to DIN STD.
 - a. Suction side: To be indicated in the offer
 - b. Discharge side: To be indicated in the offer
- vi. Impeller of the pump should be statically and dynamically balanced.
- vii. Weight of the pumps to be indicated in the offer,
- viii. Foundation bolts of steel grade 8.8 material complete with nuts and washers to be supplied with pumps.

B. WATER / FOAM MONITORS:

- a. As per class requirements, the vessel will be provided with two numbers water / foam monitors. Each monitor should be suitable for fire-fighting which will be connected to each gearbox PTO driven fire-fighting pumps. Interconnection line with isolating valve shall be provided for port and starboard monitors.
- b. Electric /Electro Hydraulic controls of fire monitors with motor specification as per class requirements. All monitor motors should have ingress protection of IP 56 and should be suitable for mounting on weather deck.
- c. Monitors should be operated both locally and remotely. Electrical control systems are to be provided with overload and short circuit protection. Monitors should contain self- locking gears to prevent uncontrolled movement
- d. Water/ foam monitors should be provided with equal swivels, each with a built in worm and wheel drive with one swivel controlling monitor elevation, the other controls monitor sweep. Both swivels should be hydro-dynamically balanced.
- e. Each monitor to be complete with high quality marine standard material fittings like pedestal, branch pipe etc.
- f. The monitors are to be of robust construction of adequate strength for all modes of operation.
- g. The monitors are to be provided with full stream nozzles and two-stage flow straightener in water pipe.
- h. The monitors should be of single/ double barrelled type where the branch pipe for foam is provided with nozzle aspirator type foam shaper. The foam barrel with built-in agitator to ensure a good foam mix before the foam leaves the barrel.





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- i. The monitor will be controlled by a remote control system. Remote control of monitors should be by Joystick and push buttons on a small portable control box with flexible cable and plug-in connector.
- j. Monitor should have two swivel assemblies to have full control over horizontal (azimuth) and vertical (elevation) movements.
- k. Each monitor should have a built -in worm gear for the control of azimuth sweep and a screw, nut and sector arm for the control of elevation, both of which should be powered by Electric/Electro hydraulic motors. Suitable bearing arrangements for the azimuth swivel and elevation swivel to be incorporated in the monitor.
- l. Remote controlled monitor should be fitted with single/double barrel, one having a dedicated water branch pipe fitted with spray deflector and the other with a straight jet stream foam branch pipe. The water barrel of the monitor should have built-in flow straightner to homogenise the water flow to the nozzle section thus ensuring optimum jet performance. The nozzle should be of well-proven type and the nozzle diameter should be calculated to suit the external fire-fighting piping system for the vessel. A remote operated, knife deflector should ensure wide spread out jet or any other method incorporated in the monitor to be indicated by the firm.
- m. The foam barrel to contain a double action nozzle. This nozzle is to have a central hole, which is surrounded by a ring of smaller holes. The central hole ensures a maximum throw length, whereas the ring of holes around the outside assures good foam. Any other arrangement incorporated in the monitor to be indicated by the firm.
- n. Each monitor will be fitted with mechanical end stops in addition to the proximity switches.
- o. The characteristics of each monitor to be indicated:

Type	Water/ Foam
Monitor Model	To be indicated
Make	To be indicated
Number of Monitors	Two
Capacity	The capacity of each dual water-foam monitor should be 1200 m ³ /h, the minimum distance should be 120 meters to meet FFV-1-NS notation
Inlet pressure	To be indicated
Inlet Flange	To be indicated
Rotation	+175 / -175 degree from datum
Elevation	+75 / -30 degree
Electric motor (Motors to have anti condensation heaters as required)	To be indicated
Reaction Force	To be indicated
Swivels	Ni Al Bronze
Gearcase	Carbon steel
Worms	Stainless steel to AISI 316L
Waterways	Stainless steel to AISI 316L



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Branch pipes	Stainless steel to AISI 316L
Deflectors	Stainless steel to AISI 316L

- p. **Monitor Range:** Monitor minimum horizontal throw shall be 120 meters at monitor elevation of 40-45 degree.
Height: Minimum vertical height is 45 meters at monitor elevation of 70 deg. The same should be demonstrated during the trials.
- q. Foundation bolts of steel grade 8.8 material complete with nuts and washers to be supplied with monitors.

4. GENERAL REQUIREMENTS OF FOAM SYSTEM:

- The water/ foam monitor has One barrel for foam and one barrel for water. The change of discharge between the water barrel and the foam barrel should be done with a switch on the operation panel, which changes the position of a valve inside the monitor.
- Foam will be supplied from a storage tank through an ejector (so as to add desired amount of foam to the water being discharged), which will be driven by a supply from the pressure side of external fire-fighting pump. The system will be controlled by a series of isolating valves.
- The foam system should be suitable for many different foam and dispersant agents which can be used.
- An ejector should have a capacity of creating pressure difference between the inlet and outlet. This is due to the change in pressure and velocity within the nozzle. The ejector will suck foam concentrate into the suction side. A small amount of foam concentrate will be mixed with the water and exits the discharge side of the ejector. The ejector should be equipped with a metering valve and check valve. The check valve will be mounted on the suction side of the ejector and prevents water from entering the foam tank if drive water stops. The metering valve should be butterfly valve with a ratio mix scale, which will be set in a position that gives 0 to 6% foam concentrate in the water being discharged from the monitor.
- The firm during on board trials of the foam system will set this. To stop and start the drive water, a butterfly valve will be supplied by the firm, which will be installed in the pipelines from the pressure side of the fire-fighting pump to the nozzle in the ejector. During trials of the foam the supplier should calibrate system on-board, before the foam mixing system can be taken into use the metering valve.

5. MATERIAL:

Material used in the manufacture and fabrication should be of highest marine quality and should confirm to ABS and IRS class rule requirements. The materials used should be approved by classification society.

6. SCOPE OF SUPPLY:

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Complete project support including design, drawings with ABS and IRS approval, certificates and consultation, satisfactory demonstration on board the ship is included in the scope of supply of firm for the entire fire-fighting system meeting ABS and IRS rules and also for foam fire-fighting.

Following equipment's / items should be included in the external fire-fighting system and should be supplied by the firm:

- a. 02 nos External fire-fighting pumps (Shaft driven Power take off from propulsion reduction gear).
- b. Each pump should be with following characteristics:
 - i. Radial split type
 - ii. Horizontally mounted, 90 degree suction bend radially and top delivery.
 - iii. Single stage centrifugal pump.
 - iv. Single suction centrifugal pump.
 - v. Each pump to be supplied with suction and discharge pressure gauges (glycerine filled) along with needle valve and mating end connectors. The ports for the suction and discharge pressure gauges to be provided on the suction and discharge flanges of the external fire-fighting pump respectively. Two nos pressure transmitters of range 0-20bar and output signal of 4-20mA to be included in the scope of supply for measuring the discharge pressure remotely in IPMS. Open/Close indication signals for pump suction and discharge valves to be provided, so that the same can be interfaced in IPMS. Shipyard will provide two ports on suction and discharge side for mounting pressure gauges with isolating cocks which are to be supplied by firm. Suitable arrangement to be made on pump discharge for mounting the pressure transmitter.
 - vi. Bearings of the pumps to be self-lubricated.
 - vii. Material of the pumps should be as follows:
 - Pump material shall conform to Class certification and regulation to meet FFV-1 NS notation
 - viii. Each fire-fighting pump should be provided with drain, greasing nipple and shaft guard.
 - ix. Capacity of the pump: 1200 m³/hr with a minimum throwing distance of 120 m (Firm to comply Class notation: FFV-1-NS to the satisfaction of classification society).
 - x. Type of shaft seal: Mechanical shaft seals (of well established manufacturers fitted to all standard pumps). As the pumps are being installed in engine rooms, seals should have high reliability to avoid leakage.
 - xi. The cooling for the running surfaces of the seal requires certain amount of cooling. The pumps should be designed with passages ascertaining that a small part of the fluid pumped is circulated over the sealing surfaces. Provision should be made to prevent the sealing surfaces from overheating by accidental dry running. Firm should forward the details about the sealing arrangement of the pump.



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c. Water/ Foam monitor: Qty 02 nos.

Water / Foam monitor suitable for installation on exposed deck should be supplied with following:

- i. Single/double barrel water / foam monitor with all necessary full stream nozzles, deflectors, built-in flow straighteners, built-in agitator for foam barrel, water branch pipe, foam branch pipe.
- ii. Remote control of monitors is to be by electric/ electro hydraulic actuators, electric motors and limit switches. Electronic joystick control for each monitor operation to be provided.
- iii. Equipped with hand wheel operation for both azimuth and elevation swivels for emergency operation, with safety covers for hand wheels having manual override for normal use and with safety interlock with the use of electric motor and hand wheel.
- iv. Monitor range: Min 120 meter (Monitor range will be measured horizontally from the monitor outlet to the mean impact area).
- v. Material: Material shall conform to Class certification and regulation to meet FFV-1 NS notation.
- vi. One junction box per fire monitor to receive ship's connection and mounted on the monitor for further distribution is to be supplied by the firm.
- vii. Maximum azimuth and elevation angle are given below:

Azimuth (Rotation): +175 / -175 degree from a datum

Elevation: +75 degree / -30 degree

Both movements should be adjustable with limit switches and emergency operation by means of hand wheels.

- viii. Each monitor to be supplied with suction pressure gauge (liquid filled) along with needle valve and mating end connectors. The port for the suction pressure gauges to be provided on the suction side of the monitor.
 - ix. Firm should indicate the Bearing arrangements for azimuth swivel and elevation swivel.
 - x. Firm should indicate Sealing arrangements for azimuth swivel and elevation swivel.
- d. 02(Two) numbers switchover unit, electrically remote controlled with necessary water branch pipe, foam branch pipe.
- e. 02(Two) numbers full stream nozzles complete with water guidance profile.
- f. Electric/ Electro hydraulic remote control of fire monitor:

Remote control arrangement of each of the fire monitor will generally comprise of the following:

- i. 01 number electric motor (as per class) for rotation (azimuth)
- ii. 01 number electric motor (as per class) for elevation.
- iii. 01 number electric motorized valve for water/ foam changeover.
- iv. 01 number main control starter panel (as per class) for both the monitors with power supply isolator, isolator switch handle. This panel should also have power supply indication and monitor drives tripped indication. Internally will be reversing contactors for the monitor movements, motor controllers and control



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circuit transformers. The necessary wiring between the monitors & panel will be carried out by shipyard on the basis of wiring diagram provided by supplier of Monitors. Only Single source of 415V, 3phase & 230V, 50HZ AC supplies will be provided, any other supply required for valves, monitors etc. must be derived from within the starter panel.

- v. 01 number MCR control panel for flush mounting, with the following should be provided:
1. Sea suction open / close button with indicator.
 2. Discharge valve open / close button with indicator.
 3. Clutch in/out switch with indicator.
 4. By pass discharge valve open / close button with indicator.
 5. Deluge valve open/close button with indicator.
 6. Power available (Ready to clutch) indication.
- g. 01 No. wheelhouse control & monitoring panel to be included in the scope of supply preferable having touch screen interface.
- h. 01 No. portable control panel having following control to be provided:
- i. Joystick for monitor movements.
 - ii. Switches for spray deflectors
 - iii. Switches for changeover water/foam with indication.
 - iv. Emergency Stop
 - v. 1 x 20m cable between the panel & main control panel, with detachable sockets for operating. Details to be elaborate in the electrical drawings.
- i. 2 Nos. junction box with suitable socket for connecting the portable control panel on weather deck and in wheelhouse should be supplied by firm. Junction box to be used on weather deck should have IP 56 protection.
- j. Valves, fittings for entire fire-fighting system and foam system as detailed below will be supplied by the firm per ship set. All valves in the system shall be ABS and IRS class approved as per the requirement. The material of the valve shall be **GM to BS1400 LG/Cast**

DESCRIPTION	QTY (NOS)
Double flanged butterfly valve with electric actuator to be installed at pump suction. ABS and IRS approved and suitable for installation under floor plating in machinery spaces.	02
Butterfly valve on fire pump discharge with electric actuator	02
Butterfly valve near monitor	02
Butterfly valve in-between interconnecting line of both monitors	01
Non return valves in foam suction	02
Foam suction isolating butterfly valves for both foam ejectors	02
Foam liquid metering valve of type butterfly valve with lever and mix ratio scale	02
Foam mixer (i.e. ATP ejector) of jet pump type with no moving parts, material of foam mixer to be Nickel- Aluminium-Bronze. Suction capacity to be indicated by the firm	02
Drive water shut off valve of type manual butterfly valve with lever	02





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Foam flushing valve of butterfly type with lever	02
Hose station (As per ABS and IRS rules)	02

- k. Any other valve / fitting not specified under scope of supply, but necessary for the satisfactory operation of the fire-fighting system as per ABS and IRS rules requirement should be indicated by the firm and supplied.
- l. All necessary safeties and alarms as required for any of the equipment's supplied by the firm, as per class rules to be supplied by the firm and list to be forwarded. All the necessary safeties and alarms required for safeguarding the equipment during its operation also to be provided.
- m. Necessary interface /output signals required for Remote operation and monitoring of the Entire system/equipment to be provided by the firm. Control and Monitoring system should meet requirements of ACC class notation of ABS and IRS equivalent.

Following indications/ signals should be provided to be integrated with ship IPMS:

- i. Sea suction valve Open / Closed.
 - ii. Pump discharge valve Open / Closed.
 - iii. Discharge Pressure indication.
 - iv. Necessary signals for interlock between sea suction valve, pump discharge valve & PTO clutch should be provided by the firm.
 - v. Any additional signal for remote operation and monitoring to be indicated and provided by the firm.
- n. Based on the submitted binding drawings for the system, MDL will prepare 3D-CAD modelling indicating pipe length, numbers of bends, fittings etc. and forward to firm. Firm should carryout detailed frictional losses calculations to prove the requisite throw is achievable.
- o. Installation and alignment procedure to be provided by the firm.
- p. Mating flanges with necessary fasteners for suction and discharge flanges to be provided.
- q. GA drawing of pump and water monitor (AutoCad format) to be submitted for checking the feasibility of installation.
- r. Proximity switches are to be provided to limit the monitor movements.
- s. The monitor and nozzle system shall be controlled by a self-contained hydraulic system. The entire hydraulic system including electrical driven pump and control valves shall be mounted within a stainless steel cabinet in the close vicinity of monitor.

Annexure "1"

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GENERAL POINT FOR MOTORS AND STARTERS

1. Motors.

- (a) Motors shall be suitable for marine use and conform to latest classification rules of American Bureau of Shipping (ABS) and Indian Register of Shipping classification requirements.
- (b) Motors shall be of standard squirrel cage continuous rated induction type.
- (c) All Motors including Fractional HP motors shall be suitable for 415 Volts, 3 phase, 50 Hz AC supply.
- (d) All Motors shall have class 'F' insulation and totally enclosed with minimum protection of IP-44.
- (e) Motors fitted on the Weather Deck shall be of IP-56 and shall be provided with anti-condensation heaters.
- (f) All motors of 50HP/37.5 KW and above shall be provided with space heaters.
- (g) Interlock is to be provided on starter for switching off the space heater when the motor is switched ON.
- (h) All motors weighing 20 Kgs, and above shall be provided with lifting eyebolts.
- (i) Name plate in English made from engraved brass (black) on weather deck and anodized aluminium (black) in other compartments, indicating motor rated starting current, full load current, rpm, class of insulation, rated voltage, rated running current, number of phases, number of poles and frequency shall be provided.

2. Cable Connections.

- (a) The electric cables shall enter the terminal box on the motor through glands, cable glands to be supplied along with the motor.
- (b) Crippage distance of 20mm space for connecting the cables inside the terminal box should be provided.

3. General.





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- (a) All motors of 13.5 HP/10 KW & above shall be provided start-Delta Starters or soft starters.
- (b) Motors below 13.5 HP/10 KW shall be provided with direct on-line starters.
- (c) Fractional HP motors shall be provided with suitable MCCBS/MCBs only.
- (d) Starters to have current protection.
- (e) Starters shall be provided with under voltage protection for motors above/ HP.

4. **Electrical Supply.**

- (a) The starter shall be suitable for 415 Volts, 3 Phase, 50Hz Ac supply.
- (b) The starter shall be provided with Triple Pole Isolator Rotary type incomer.
- (c) MCB/ MCCB.
- (d) ON and OFF Push Buttons.
- (e) Control fuses.
- (f) Motor 'ON' LED indication for Local and remote(As applicable).
- (g) Provision for Auto ON/OFF facility(As applicable).
- (h) Electronic external/separate single phasing preventer to be provided to protect all the three phases of the motors rates 13.5 HP/10KW and above.
- (j) Provision for remote ON-OFF Facility.
- (k) Spare NO/NC contacts for interfacing as required to be provided.
- (l) KED indications with tallies for the following fault condition to be provided.
- (m) Single phasing.
- (n) Overload.
- (p) Thermister Over Heating, if applicable.
- (q) Contactor with two potential free contacts(spare).
- (r) Timer applicable.





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- (s) Over Load Relay (85 to 150%).
- (t) Provision of connecting anti-condensation heater/ space heater.

6. Thermister and overload Protection.

- (a) The motor thermal protection system in the starter must detect the abnormal rise in temperature by means of positive temperature co-efficient thermistors (PTCT). Motor should trip due to rise in temperature.
- (b) Timer.
- (c) It should have wide operating range, repeated accuracy and wide time setting.
- (d) Electronic timers should be provided for Star-Delta application.
- (e) Thermal timers to be provided for over lead protection.

7. Mechanical Construction.

- (a) The motor starter panel shall be made of 14 SWG Aluminium construction conforming to (A5083 Hill or H 112 or H 116) or (A5086 Hill or H 112 or H 116) or 16 SWG MS Sheet Steel confirming to IS-2026. The panel and assemblies are to be reinforced to withstand the mechanical, electrical (Magnetic) and thermal stresses likely to be encountered in service and are to be protected against corrosion. The panel to be power coated and of dead front type.
- (b) Control Panel fitted on the weather deck shall be made of non-magnetic 16 SWG mat finish stainless steel conforming to IS-316 with IP-56 protection.
- (c) The control panel shall be suitable for bulkheads/in-built eqpt mounting with necessary bolts, nuts, washers, spring – shock mount, screw less terminals etc.
- (d) Suitable locking device will be provided for fixing screws and bolts for preventing them from loosening.
- (e) The panel shall be provided with single hinged door with efficient locking device and door stoppers with Neoprene gasket all around. It shall be suitable for front side maintenance support services.



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(f) The bottom plate shall be of removable type for cable entry through cable glands.

(g) Size of panel to be as small as possible considering space constraints on ship.

8. **Cable Connections.**

(a) The electric cable shall enter the panel from bottom through glands, cable size will be indicated by MDL for supply of cable glands.

(b) The screw less connecting terminals shall be positioned at the bottom of the panel, with all the internal wiring terminated on one side.

(c) Cripbage distance of 20mm space for connecting the cables inside the panel should be provided.

(d) 10% spare terminals to be provided.

(e) All electrical supports inside the starter panel shall be of high quality and moisture resistant materials. The contact surfaces and studs of all devices, to which electrical connections are made, shall be tinned.

9. **Internal Wiring.**

(a) The Internal wiring shall be made by using LFH type copper multi-stranded conductor flexible cables of adequate rating with minimum 1.5 sq. mm. size and has to be neatly dressed and bunched.

(b) All control and auxiliary wirings shall be provided with numbered ferrules at both the ends for easy identification.

(c) A laminated circuit diagram plate to be provided inside the panel at appropriate place. Suitable earthing to be provided for earthing the panel with the ship hull.

10. **Name Plate.**

(a) Name plate in English made from anodized aluminium (black) shall be provided for all devices in the panel to identify their function.

(b) Component tallies shall be provided for all the components inside the starter panel.

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(c) Operating voltage tally shall be provided on the front top. Operating voltage tally shall be in red letters.

11. Painting Scheme.

(a) Starter Panel to be painted with Polyester power coating of RAL-7032 paint.

12. Spares.

(a) Standard spares for unrestricted service meeting the classification should be included in the scope of supply and the list of such spares with Part/Pattern number and quantity in numbers are to be furnished in the offer. These spares are to be supplied as a part of the equipment.

13. Binding Drawings/Documentation.

(a) General arrangement Drg. Of Motors and Starters including weight and dimension.

(b) Internal Wiring Diagram.

(c) Calibration Certificate for timers, Thermisters and Overload relays as applicable.

14. Trials.

(a) Acceptance of Motors and Starters will be Subject to Satisfactory Results of Performance tests and routine tests. The tests data offered during Performance tests of Motors in Factory Premises to be documented and forwarded to MDL, as part of the Documentation.

(b) Tables of Relay Ranges, Fuses, MCBs, MCCB, Timers & SPP for Motor Protection.

Annexure '2'



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DEVIATION LIST

The Supplier shall fill in this form for the deviations of their bid from the requirements as stated in the Material Requisition. If no deviation is required Supplier shall fill in "NIL" in the 'Deviation column. Supplier shall sign/date and affix their company seal.

SR. No.	DOCUMENT No./ CLAUSE No.	REQUIREMENT	DEVIATION WITH REASONS	CGHQ / MDL REACTIONS

SUPPLIER'S COMPANY SEAL
DATE

SUPPLIER'S SIGNATURE &

A-ACCEPTED N-NOT ACCEPTED C-CONDITIONAL ACCEPTANCE (SEE ATTACHED SHEET)





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Annexure '3'

WEIGHT CONTROL DATA SHEET

EQUIPMENT DESCRIPTION		EQUIPMENT NO.	
COMPARTMENT		LOCATION	

SWBD :

TOLERANCE CODE
 PRELIMINARY EST.
 DESIGN EST.
 M.T.O (CALC)
 WEIGHED
 TOLERANCE ± %

1. WEIGHT (Kg.)

(a)	DRY	Kg ±	%
(b)	FLUID	Kg ±	%
(c)	OPERATING	Kg ±	%
(d)	TEST	Kg ±	%
(e)	TOTAL	Kg ±	%

2. EQUIPMENT DIMENSIONAL DATA (mm) & Co-ordinates of CoG

 PLAN	 PLAN	 PLAN
 ELEVATION	 ELEVATION	 ELEVATION

OVERALL SIZE		CENTRE OF GRAVITY	
'A'		'X'	
'B'		'Y'	
'C'		'Z'	

NOTE :

- ALL OFFERS SHALL INCLUDE THIS DATA SHEET DULY FILLED IN BY THE SUPPLIER (SIGNED, DATED & SEAL AFFIXED).
- ALL FINISHED ITEMS SHALL BE WEIGHED & A CERTIFICATE SHALL BE PROVIDED AS PER ATTACHED SHEET.
- SEPARATE SHEETS SHALL BE COMPLETED FOR EACH INSTALLED EQUIPMENT.
- ORIGIN OF 'X', 'Y' AND 'Z' TO BE INDICIATED.

SUPPLIER'S SEAL

SUPPLIER'S SIGNATURE & DATE



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Annexure '4'

WEIGHT CERTIFICATE

EQUIPMENT DESCRIPTION:

EQUIPMENT NO. :

The form shall be completed by Supplier & shall be supplied along with the equipment.

**SUPPLIER'S
NAME**

ADDRESS

TELEPHONE NO.

ORDER NO.

Ref. Drg. No.

Part No.

EQPT. NO.

METHOD OF WEIGHING:

Supplier shall prescribe Method & Equipment Used:

**DATE OF LAST
CALIBRATION**

**SPECIFIED ACCURACY
REQUIREMENT**

NOTE :-

RESULT OF WEIGHING TOTAL EQUIPMENT DRY WEIGHT

(Excluding packing, temporary protection etc.)

ALLOCATED WEIGHT

(Weight estimate agreed by purchaser
and supplier based on order specs).

REASONS FOR VARIATION BETWEEN ALLOCATED WEIGHT AND CERTIFIED WEIGHT:

WEIGHING ADDRESS:

WITNESSED BY

FOR SUPPLIER

FOR PURCHASER

Representative

Representative

Date:

Signature / Date & Seal

Signature/Date & Seal



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Annexure '5'

Compliance Matrix

EQUIPMENT DESCRIPTION:

EQUIPMENT NO. :

The form shall be completed by Supplier & shall be supplied along with the equipment.

**SUPPLIER'S
NAME**

Ref. Drg. No.

ADDRESS

Part No.

**TELEPHONE
NO.**

ORDER NO.

EQPT. NO.

S No.	Tender Specifications Para reference	Brief Description as per Relevant Tender Specifications	Compliance to Tender Specifications	Deviations if any, with Reasons	Remarks if any
SUPPLIER'S COMPANY SEAL			SUPPLIER'S SIGNATURE & DATE		



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ANNEXURE '6'

Checklist with offer:

The supplier to supply as a minimum the following information along with his technical offer:

- 1) Technical Specification of the equipment's.
- 2) Details of all connections to equipment, Vibration details with pattern no, seat details, flange details etc.
- 3) GA drawing of all equipment's, sub-assemblies & accessories.
- 4) Technical parameters of all equipment & accessories.
- 5) Outline drawings of the equipment indicating overall dimensions, C.G. and Maintenance envelope.
- 6) P & ID and E&ID diagram.
- 7) Complete Weight breakdown (excluding & including oil).
- 8) Heat dissipation of the Equipment
- 9) Details of other ship services required.
- 10) Tools required for maintenance.
- 11) Recommended onboard and base spares holding (for 3 year and 5 years operation respectively)
- 12) Manufacturers list of spares for installation & Commissioning.
- 13) Instrumentation List & Diagram.
- 14) Brief on integration of Control System with ship's Integrated Control System.
- 15) Inter-unit cabling diagram clearly indicating each unit/sub-unit and types of cables being used for the system.
- 16) Requirement of Greases, Oils etc., with their equivalents.
- 17) Proposed factory tests and Inspection plan.
- 18) Proposed preservation plan.
- 19) Delivery time from receipt of order.
- 20) Clear demarcation between the scope of supply of firm and that of the yard.
- 21) List of equipment required for installation and operation of the equipment and not supplied by the manufacturer.
- 22) Trial and commissioning time of complete system on board.
- 23) Special tools and test equipment to be supplied for on board maintenance.
- 24) List of main equipment included in the standard scope of supply.
- 25) List of accessories inclusive / not inclusive in the standard scope of supply.
- 26) List of tools & accessories required for installation & commissioning
- 27) Reliability parameters.
- 28) User list of similar equipment supplied by the manufacturer.
- 29) Details of standard and optional factory tests.

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MOTOR:

- 1) Service
- 2) Type of motor
- 3) Power supply – Voltage, Frequency & No. of phases
- 4) Output of motor
- 5) RPM (No load and full load)
- 6) No. of poles
- 7) Full load current
- 8) Starting current
- 9) Starting torque when the ambient temp. is 30oC
- 10) Pull out torque
- 11) Run up time
- 12) Motor Enclosure & Protection provided
- 13) Noise & Vibration level
- 14) Class of insulation
- 15) Method of starting – Remote, local facility & indication
- 16) Type of winding
- 17) Weight of the motor
- 18) Over all dimensions of the motor
- 19) Terminal connection detail
- 20) Efficiency at 100%, 75% & 50%
- 21) Power Factor at 100%, 75% load
- 22) Direction of rotation
- 23) Shaft material
- 24) Lifting arrangement of motor
- 25) Whether RIS unit provided
- 26) Whether heaters are fitted and supply voltage to heater is indicated
- 27) Whether heater supply required
- 28) Frame size
- 29) Method of mounting
- 30) Serial no of machine
- 31) Duty cycle (period of output)
- 32) Particulars of shaft end
- 33) Heat dissipation

STARTER:

- 1) Service
- 2) Type of starter
- 3) Voltage, frequency and No. of phases
- 4) Protection provided
- 5) Enclosure
- 6) Vibration level



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- 7) Method of mounting and requirement of mounts
- 8) Method of starting, remote and local control
- 9) Facilities and indication provided.
- 10) Weight and overall dimensions of the equipment
- 11) Rating of the contactors
- 12) Spares provided
- 13) Class of insulation



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Annexure '7'
MANUFACTURER'S RECOMMENDED LIST OF SPARES TOOLS AND SOFTWARE (MRL-OBS)

VESSEL/ EQUIPMENT: 01 TRAINING SHIP

Sr No	Eqpt Part No./ Model no./SI No.	Eqpt Description	OEM Name	Vendor Name	Illustrated Spare Part List (ISPL) Reference/ Part No. of	Desc of Spare	Country of Origin	Unit Price	Seller Order No. & Date	Currency Code	Total Qty	VED* Category	Recommended scale for 01 Training Ship	Remarks

MANUFACTURER'S RECOMMENDED LIST OF SPARES (MRL-B&D)

VESSEL/ EQUIPMENT: 01 TRAINING SHIP

Sr No	Eqpt Part No./ Model no./SI No.	Eqpt Description	OEM Name	Vendor Name	Illustrated Spare Part List (ISPL) Reference/ Part No. of Spare	Desc of Spare	Country of Origin	Unit Price	Seller Order No. & Date	Currency Code	Total Qty	VED* Category	Recommended scale for 01 Training Ship	Remarks

*VED- VITAL / ESSENTIAL/ DESIRABLE analysis of spares to be carried out by OEM prior to submission to the Buyer.
 Original Equipment Manufacturer (OEM): _____ (Complete Address)

1. Data regarding maintenance spares/stores like lubricants, sealing compound, gases should be given separately giving source of supply.

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2. Data furnished as OBD and B&D should also include software backups, as applicable
3. In "Remarks" column following information (if applicable) be given:-
 - a) If an item has a shelf/operational life it will be marked as 'G' and life be indicated
 - b) Matching set of components be indicated.
 - c) Item which can be locally manufactured in India should be marked 'LM'.
 - d) Items which cannot be manufactured in India due to sophisticated design/ technology may be marked as 'SI' (Special Item).
 - e) If a component/assembly is common to other similar equipment offered by the OEM earlier, these should be marked 'CM' and Name of the equipment be indicated.
4. OBS and B&D spares list should be drawn out of the 'Part List' of the equipment, which should be separately given as part of Technical Manuals.
5. If the main equipment consists of other equipment, then OBS and B&D spares list should be prepared for them under proper heads. OBS and B&D spares list is to be prepared as per the maintenance concept of the customer.
6. Items provided along with the equipment as spares should also be included in OBS and B&D list
7. Modules/ Shop Replaceable Unit (SRU) / assemblies should be listed and their components should be included under them so as to relate each item of spare to their module / SRO / assembly.
8. OBS and B&D list for test equipment should also be provided on the similar format.
9. Cost to be indicated in Price bid only.

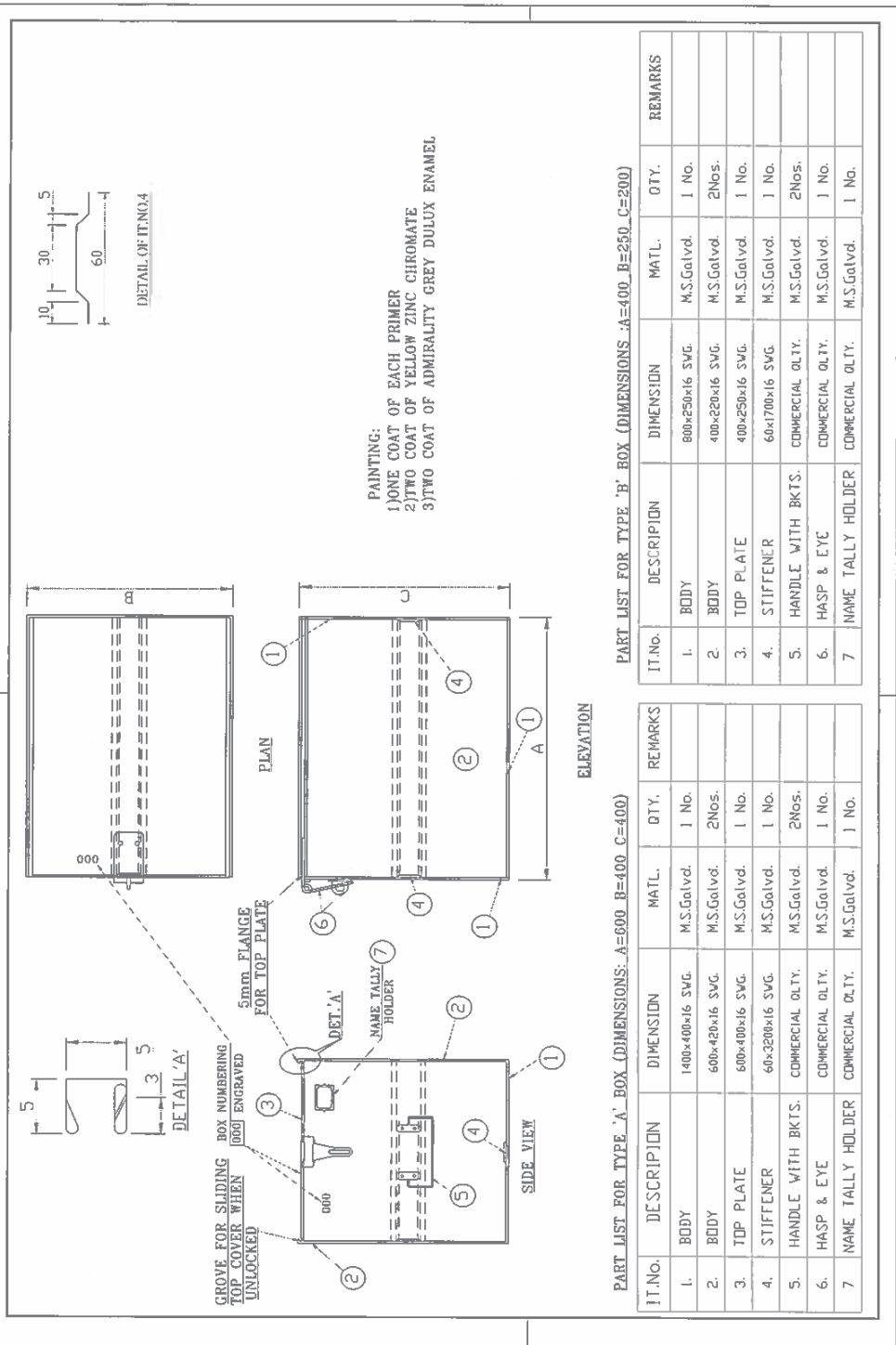


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Annexure '8'
REFERENCE DRAWING FOR SPTA BOX



PART LIST FOR TYPE 'A' BOX (DIMENSIONS: A=600 B=400 C=400)

IT.No.	DESCRIPTION	DIMENSION	MATL.	QTY.	REMARKS
1.	BODY	1400x400x16 SVG.	M.S.Galvld.	1 No.	
2.	BODY	600x420x16 SVG.	M.S.Galvld.	2Nos.	
3.	TOP PLATE	600x400x16 SVG.	M.S.Galvld.	1 No.	
4.	STIFFENER	60x3200x16 SVG.	M.S.Galvld.	1 No.	
5.	HANDLE WITH BKTS.	COMMERCIAL DLTY.	M.S.Galvld.	2Nos.	
6.	HASP & EYE	COMMERCIAL DLTY.	M.S.Galvld.	1 No.	
7.	NAME TALLY HOLDER	COMMERCIAL DLTY.	M.S.Galvld.	1 No.	

PART LIST FOR TYPE 'B' BOX (DIMENSIONS: A=400 B=250 C=200)

IT.No.	DESCRIPTION	DIMENSION	MATL.	QTY.	REMARKS
1.	BODY	800x250x16 SVG.	M.S.Galvld.	1 No.	
2.	BODY	400x220x16 SVG.	M.S.Galvld.	2Nos.	
3.	TOP PLATE	400x250x16 SVG.	M.S.Galvld.	1 No.	
4.	STIFFENER	60x1700x16 SVG.	M.S.Galvld.	1 No.	
5.	HANDLE WITH BKTS.	COMMERCIAL DLTY.	M.S.Galvld.	2Nos.	
6.	HASP & EYE	COMMERCIAL DLTY.	M.S.Galvld.	1 No.	
7.	NAME TALLY HOLDER	COMMERCIAL DLTY.	M.S.Galvld.	1 No.	

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Annexure '9'

Maintenance Management Software (MMS) format

Maintenance Interval Schedule	Tasks to be performed	Detailed task description with corresponding equipment image in PDF/ jpeg format	Spare required for performing the tasks			Tools required
			Description	Quantity	Dimension/ weight	
Example:						
Initial 500 Hours	Aux water pump inspect	Check following components for wear and damage 1)Bearings 2)Impeller 3)Seal	Nil	Nil	Nil	1) 1U-7546 chain wrench 2)Engine standard tool kit
	Battery electrolyte level check	1)remove filler caps 2)Add only distilled water if necessary 3)Keep the battery clean 4)clean the terminals with fine grade of sandpaper if required.	Distilled Water	Nil	Nil	
	Engine oil filter change	1)Remove oil filter with 1U-7546 chain wrench 2)Clean sealing surface of filter mounting. 3)Apply clean engine oil to new oil filter gasket 4) intall the new oil filter. Tighten the filter until filter gasket contacts the base. Do no overtight the oil filter.	2) Oil filter gasket	1	Nil	

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Annexure "10"
TIMELINES FOR TASKS AND DELIVERABLES

FOR MDL			
Activity	Yard 16101		Duration (Weeks)
	From	To	
Placement of order	P		P
1 Binding Data	P	P+3	03
2 QAP	P	P+4	04
3 Manufacturing Drawing	P	P+3	03
4 FAT & Certification	E-12	E-4	08
Equipment Supply			E
Documentation			As per SOTR
7 Preservation			As per SOTR
(a) In Stores OR			
(b) On-board			
Services of Engineers			As per SOTR
(a) Installation			
(b) STW			
(c) HATs			
(d) SATs			
(e) For Routines			
(f) Training			
9 OBS for two years			As per SOTR





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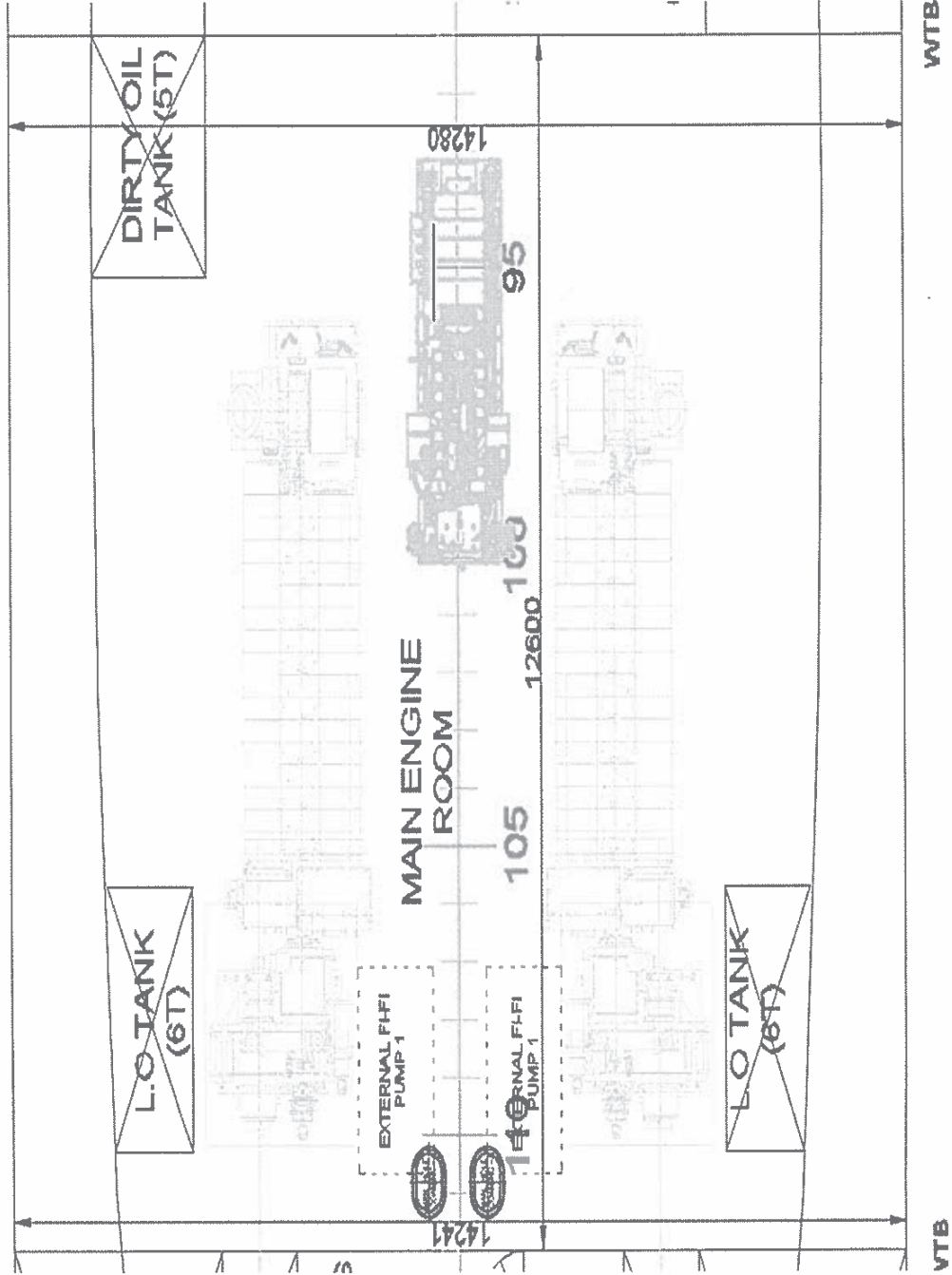
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FOR MDL		
Activity	From	To
10 Warranty	As per SOTR	Duration (Weeks)
11 B&D Spares	As per SOTR	

* - These end dates will be indicated as calendar dates in the Purchase Order.
P- Placement of Purchase Order, E- Equipment Delivery, D- Planned Delivery
Above timelines are tentative, subject to change.

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Annexure: 11 (GENERAL ARRANGEMENT OF ENGINE ROOM)





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SHIPBUILDING DESIGN ENGINEERING
DOCKYARD ROAD, MUMBAI - 400 010

STATEMENT OF TECHNICAL REQUIREMENTS
FOR
EXTERNAL FIRE FIGHTING SYSTEM

PROJECT	:	06 NEXT GENERATION OFFSHORE PATROL VESSELS (NGOPV)
YARD NOS MDL	:	16401/16402/16403/16404/16405/16406
CLIENT	:	INDIAN COAST GUARD
DOCUMENT NO	:	3047
ICG HQ REFERENCE / APPROVAL	:	SA/0159/06NGOPVs/13 dated 26 Feb 24.
CLASSIFICATION NOTATION	:	+ A1 HSC(E) (Special Government Service) + AMS NIBS +ACC +DPS-1,FFV1-NS CS-Ready, HELIDK(SRF) by ABS or equivalent of LRS/DNV/GL/BV/IRS/NK

02	PD MAT email dated 18 Mar 2024	18.03.2024	
01	SOTR Approval against Letter Ref.No. SA/0159/06NGOPVs/13 dated 26 Feb 24.	27.02.2024	
00	First Issue	30.01.2024	
REV.	DESCRIPTION	DATE	AUTHORISED BY
RAVINDRA MANWATKAR CM (D-E)	S G SONAWANE CM (D-L&Wn)	C M VISHWAKARMA AGM/ HOS (D-E)	
Prepared By	Checked By	Approved By	



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DESIGN ENGINEERING
YARD
16401/16402/16403/16404/
16405/16406
EXTERNAL FIRE FIGHTING
SYSTEM

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ACRONYMS

CPP	-	Controllable Pitch Propellers
DE	-	Diesel Engine
DER	-	Diesel Engine Room
FATs	-	Factory Acceptance Trials
HATs	-	Harbour Acceptance Trials
HPU	-	Hydraulic Power Unit
IPMS	-	Integrated Platform Management System
MDL	-	M/s Mazagon Dock Shipbuilders Limited, Mumbai
OEM	-	Original Equipment Manufacturer
SATs	-	Sea Acceptance Trials
MCR	-	Machinery Control Center
STW	-	Setting to Work
CGRPT		Coast Guard Refit and Production Team
ICG		Indian Coast Guard
NGOPV		Next Generation Offshore Patrol Vessels

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SECTION I:

INTRODUCTION

1. This General Specifications relate to Design, approval of the equipment by the classification society, Manufacture and Supply of 06 (six) ship set of Equipment for Project "Next Generation Offshore Patrol Vessels (NGOPVs)" of Indian Coast Guard.
2. Project 06 NGOPV consist of Diesel Engine propulsion system comprises of two propulsion plants, each plant consisting of one Diesel Engine driving a Controllable Pitch Propeller and External Fi-Fi pump through single input and twin output Reduction Gearbox and respective shaft line. Each propulsion plant broadly comprises of:
 - (a) One Diesel Engine of minimum 9000 KW power output.
 - (b) One single input, twin-output Reduction Gearbox with built in thrust block.
 - (c) One set of shafting along with associated components
 - (d) One Controllable Pitch Propeller
 - (e) Propulsion plant support systems (for Diesel engines, Gearboxes, Shafting & CPP)
 - (f) Associated Controls & Monitoring System.
3. Class notation for 06 NGOPV is:
+ A1 HSC (E) (Special Government Service) + AMS NIBS +ACC +DPS-1, FFV1-NS CS-Ready, HELIDK (SRF) by ABS or equivalent LRS/DNV/GL/BV/IRS/NK.
4. The Supplier should submit the quotation based on the General Conditions & Requirements (GCR) and the Technical Requirement for Procurement of each equipment. Should there be any discrepancies between the GCR and the Technical requirement of each equipment, the technical requirement/ specification shall prevail.
5. The reference list of the equipment fitted in Indian or International Navy / Coast Guard or similar platform such as ocean going vessel, Offshore Platforms and Oil-Rigs to be submitted along with the offer.
6. The Year of production of equipment and system to be of latest manufacture (during or after Year 2023). This is to confirm to the current production standards and should have 100% of the defined life at the time of delivery.
(other than permitted running hours during assembly / acceptance trials)
7. The list of indigenous lub oil / hydraulic oil to be furnished.

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GENERAL CONDITIONS & REQUIREMENTS

1. **Subject:** The general conditions and requirements specified in this chapter are intended to meet the functional requirements of a NGOPV with integral helicopter capable for operation in oceans environment and performance of all the ICG charter of duties.
2. **Ship's Basic Particulars:** The role of NGOPV class of ships would be Coastal and offshore Patrolling, Policing Maritime Zones of India, Fisheries Protection and Monitoring, Control and Surveillance, Anti-Smuggling and Anti-Piracy, Search and Rescue, Limited Pollution Response against Marine Oil spill etc. Ship's basic particulars, are indicated below:

Table 1

PARTICULARS		REFERENCE DATA
Ship's dimensions	Length overall (LOA)	115.3 m
	Beam (water line)	14.5 m
	Draft (deep displacement)	3.84 m
Ship's displacement	Deep displacement	Around 2886Tonnes
Endurance	At cruising speed of 14 knots	5000 NM
Expected ship's life		25 Years
Operating profile	Continuous slow speeds	Below 8 knots
	Cruising	08 - 15 knots
	Maximum	23 knots at 92% MCR at full load displacement
Unrestricted continuous rating of Diesel engine, at 45 degree centigrade ambient temperature		Min 9000 KW

3. **Reference Environmental Conditions:**

- 3.1 The equipment shall be suitable for marine applications and achieve specified performance smoothly under tropical marine conditions.
- 3.2 The equipment is to be designed for continuous operation & survival under the environmental conditions specified for ambient conditions as specified table below:-

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Table 2

Sr. No.	Design Parameter	Value
(a)	Air Temperature	Minimum of 5 deg C and Maximum of 45 deg C
(b)	Sea water temperature	32 deg C
(c)	Relative humidity	90% at 35 deg C
(d)	Atmospheric pressure	750 mm of Hg column (1000mbar)

- 3.3 **Seaway Conditions:** Seaway conditions are defined at a sea water temperature of 1 to + 32 Deg. C, Ambient air temperature of 5 to 45 Deg. C and humidity up to 90% at 35 Deg. C. Salinity of water up to 35000 ppm. The equipment shall be capable of efficient and unrestricted operation without any deviation from its normal operating parameters under the seaway conditions, as below:-

Table 3

Operational (up to sea state 7 and upto a significant wave height of 8.65m)	
Roll	Maximum \pm 22.5 degree
Pitch	Maximum \pm 7.5 degree
Survival (up to sea state 7)	
List	Maximum \pm 15 degree from vertical (permanent)
Trim	Maximum \pm 05 degree

3.4 **Complement :**

(a)	Officers	11
(b)	Subordinate Officers	32
(c)	Others	78
	Total	121

- 3.5 **Propulsion Plant Operating Profile:** The ship is to be available for exploitation for minimum of 120 days in a year. Each shaft is expected to clock a minimum of 2500 running hours per year. Operational cycle of the ship will be around 36 months.



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3.6 **Service life of ship:** The expected service life of ship is 30 years @ 2500 hrs. annual exploitation

4 **Ship's Support Systems Supplies:** Following ship's support supplies shall be available for the propulsion system. For electrical supplies, in case of different requirements (voltage/frequency, etc.), the equipment supplier shall provide suitable provision (transformer/converter/UPS, etc.).

Table 4

Sr. No	SYSTEM	SUPPLIES	REMARKS
(a)	Fuel system	Low sulphur high flash high speed diesel (LSHFHSD)	Indian equivalent
(b)	Lube oil system	Indian equivalent to be indicated by OEM	Indian Oil Ltd HPCL, BPCL equivalent
(c)	Compressed air system	High pressure air at working pressure of 30 bar & 30 cu m/hr. Suitable reduction available for working pressure at 30 bar & 7 bar.	Any other pressure requirement shall be met by the equipment supplier.
(e)	Fresh water system	Fresh water at 3 bar (approx.) shall be provided by ship's fresh water system.	Specific requirements to be indicated by equipment supplier.
(f)	Electrical	415 V AC @ 50 Hz, 3 phase 230 V AC @ 50 Hz, 1 phase	Any other power requirement shall be met by the equipment supplier.

5 **Noise & Vibration:**

5.1 Design of the equipment along with its associated auxiliaries/accessories/controls and mounting system, should ensure minimal vibration and noise.

5.2 All components of the equipment and accessories are to be designed for ensuring resistance to misalignment due to forces of vibration.

5.3 Suitable flexible hoses, bellows and noise reduction clamps are to be used for associated piping connections with the main equipment/auxiliaries.

5.5 Specific requirements on Noise & Vibration are to be as per respective equipment Technical Specification for Procurement.

5.6 Noise and Vibration levels of the equipment shall meet the classification rules and guidelines.



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- 6 **Noise Levels in Machinery Spaces:** Permissible noise levels in machinery spaces are to be in accordance ISO-6954:2000. The noise criteria laid down by IMO resolution A 468(XII) is to be taken as reference.

The noise criteria for the compartments are as follows:

Sr. No.	Compartments	DB(A)
1.	Machinery spaces	110
2.	MCR	75
3.	Work places	85
4.	Non Specific workshops	90
5.	Bridge and Chartroom	65
6.	Radio Rooms	65
7.	Cabins	60
8.	Dining Hall/Offices	65
9.	Service spaces (galley, pantry)	75
10.	Normally unoccupied spaces	90

7 **Vibration Isolators (Anti Vibration Mounts) :**

- 7.1 For resiliently mounted equipment, the mounting system shall be capable of attenuating the vibrations of the offered equipment within the limit specified in Technical requirement.
- 7.2 The installation and connections of the equipment shall account for the extreme displacements that may occur under loading conditions. Wherever necessary, suitable stops/snubbers shall be provided to prevent excessive motion.
- 7.3 Vibration measurements are to be carried out as per ISO 4868(XII)/latest amendment.

8 **Electrical Equipment Requirements:** General requirements for electrical equipment (including Motors & Starters) shall confirm as per attached Annexure – 1.

- 8.1 **IP Rating for Electrical Equipment:** IP rating for associated electrical equipment enclosure is IP 44. Specific IP rating to be as per Technical requirement in Section II.

9 **Availability/ Reliability/ Redundancy/ Self Sufficiency:** Maximum time required for bringing the equipment to full operational condition while undertaking daily, weekly and monthly maintenance routines, are to be indicated by the equipment supplier.

- 9.1 Equipment should be robust in design for ensuring high reliability, ease of operation and minimum maintenance.

10 **Documentation:** Various documentation will be submitted by the equipment supplier as per the scope of supply and responsibility. Quality documentation is to be submitted in comprehensive and time bound manner for meeting ship's detailed design and production targets as well as equipment production and delivery schedule. Documentation to be

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submitted by the equipment supplier are broadly indicated below:

Table 5

Sr. No.	Documentation	Remarks
(a)	Binding design documentation	For progressing with detailed design, integration & installation.
(b)	(i) Quality Assurance Plan (QAP) (ii) Equipment manufacturing/production documentation (iii) Test and Trial procedure/ Reports	For approval by ABS and IRS equipment quality assurance during production and Test & Trial accordingly.
(c)	Equipment STW/HATs/SATs documentation	For preparing installation inspection/Test and trials documentation
(d)	Technical Manuals for equipment operation, maintenance, logistics, etc.	For ship's crew, training and repair organizations.

10.1 All documentation (including documents, drawings, data, reports, manuals, etc.) should be in English language. Dimensional details in the drawings should be as per scale. Technical data and parameters should be in metric units (SI Units).

10.2 Following file/formats would be acceptable:

- (a) Documents, data & reports in MS-WORD/EXCEL, as applicable
- (b) Data base files in ACCESS
- (c) Orthographic drawings (2D) in DXF/DWG format
- (d) 3D model of external topography of the equipment only in AVEVA MARINE/.STP format of max size of 5 MB

Above drawings/data are to be submitted in soft copies in latest software version.

10.3 Hard documents to be provided suitably grouped (section wise H, E, L, Navigation & Communication etc.) indexed and in moisture proof bound folders.

10.4 **Binding Design Documentation:** Comprehensive list of binding design documentation is to be submitted by equipment supplier, in a structured manner under various levels (I, II & III), along with time schedule. Indicative list (but not limited to) is mentioned below:

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Table 6

Sr. No.	DRAWINGS / DOCUMENTATION
Level I : Submission within 02 weeks of placement of order by Shipyard	
(a)	Technical description on main equipment along-with associated auxiliaries/components with operating principle
(b)	General arrangement drawing of equipment and major sub-assemblies along with footprint in 1:25 or appropriate scale
(c)	Assembly drawings of main & associated auxiliaries/components including:- <ul style="list-style-type: none"> • Main dimensions • Mounting arrangement (including details on shock mounts) • Bolting plan • Position & dimension of all Interface details • Operational and maintenance envelopes • Weights • Materials with their specifications • Centre of gravity & lifting points • Flow rate & direction • Etc.
(d)	Equipment performance data
(e)	Characteristics data, curves, efficiency, etc., related to equipment performance
(f)	Heat emission data
(g)	Equipment support systems functional specifications, as applicable along with schematic drawings (such as starting, fuel, lub oil, compressed air, intake, uptake, cooling, hydraulic, vents/drains, controls/monitoring, etc.) including interfaces with shipboard systems
(h)	Data/details for equipment foundation design and interfaces with ship structure
(i)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable
Level II : Submission within 04 weeks of placement of order by Shipyard	
(a)	Equipment control & monitoring data/details along-with structured list of sensors, signals & instrumentation (including in-built sensors for online health condition monitoring)
(b)	Control & monitoring interface data/details for interface with other propulsion equipment and ship's IPMS
(c)	Electrical specifications & wiring diagrams for associated electrical components, local control panels, etc.
(d)	Detailed definition of all terminal points and interfaces, major terminal box diagram, winding & performance data sheet.
(e)	Noise and vibration data/details
(f)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable

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Level III : Submission within 06 weeks of placement of order by Shipyard	
(a)	Installation drawings, with interfaces and tolerances; main equipment along-with associated auxiliaries/components along with seat machining requirement & torque value of bolts which are tightened in situ.
(b)	Equipment alignment calculations and its procedure
(c)	Shipping/Unshipping requirements
(d)	List of special tools, instrument, Handling & lifting gear (including jigs & fixtures), as applicable forming part of deliverables and associated procedure
(e)	Flushing requirements and procedure for equipment and its support systems
(f)	Preservation, re-preservation and upkeep procedure; including requirement of preservatives (oils, greases, etc.) with international or NATO equivalents along with chemical composition and physical properties.
(g)	Vibration Analysis; Torsional, Lateral & Longitudinal, as applicable
(h)	Reliability, Maintainability and Availability analysis
(i)	Failure Mode and Effect Analysis (FMEA) (if applicable)
(j)	Training plan
(k)	Any other documentation, as applicable

10.5 Documentation Associated with Quality Assurance Plan, Equipment Manufacturing & FATs/Test & Trials: Documentation associated with quality assurance plan (QAP), equipment manufacturing and FATs(Factory Acceptance Tests), will be submitted by the equipment supplier in time bound manner, well in advance for approval by the designated classification society.

- 10.5.1 While preliminary quality assurance & test plan shall be submitted by the equipment supplier along with the technical offer, detailed QAP is to be submitted within 15 days after placement of equipment order, for approval of ABS and IRS class.
- 10.5.2 Prior to commencement of equipment production activities, equipment supplier shall consult designated Classes and Shipyard/ICG.
- 10.5.3 Documentation associated with equipment manufacturing would be submitted by equipment supplier progressively in time bound manner, for approval by designated classes.
- 10.5.4 Documentation associated with equipment FATs procedure shall also be submitted by equipment supplier well in advance in time bound manner, for approval by the designated classification society.

10.6 Documentation Associated with STW/HATs/SATs: Documentation associated with equipment setting To Work (STW)/ Harbour Acceptance Trials (HATs)/ Sea Acceptance Trials (SATs), shall be submitted by the equipment supplier within the agreed time schedule, with designated classification society and Shipyard/ Indian Coastguard.

- 10.6.1 HATs/SATs documents shall include HATs/SATs schedule, procedure, pre-requisites, data to be recorded, time interval for data recording, formats for data recording, safety and precautions to be observed during trials, estimated time of the

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trials and all other relevant data/information required for the successful completion of the trials.

10.7 Technical Manuals for Equipment (Operation, Maintenance & Logistics) : The technical manuals/documentation pertaining to equipment & its associated auxiliaries/support systems, shall include technical description/information, specifications, drawings, performance data, installation, operational & maintenance requirements, spares & logistics, etc., in systematic, structured & comprehensive manner.

10.7.1 Under operating instructions, pre-starting inspection/checks, starting & shutdown procedures, functional parameters, trouble shooting, fault analysis, precautions, etc. to be suitably covered.

10.7.2 Procedures for undertaking all maintenance routines till the end of service life (for the entire life cycle) (including major overhaul), are to be clearly specified along with preservation/ de-preservation & upkeep requirements (when equipment is not in use, during long refit of ship).

10.7.3 Procedures for setting to work, test & trials of equipment are also to be well documented.

10.7.4 Following technical manuals/documentation (in hard and soft form) shall be provided by the equipment supplier along with equipment supply.

Table 7

Description	Content	Number of copies per ship
Technical Manuals	Technical Description and Operating Instructions Manual	7
	On board Maintenance Manual	7
	Field and Depot Maintenance Manual	7
	Installation and Testing Manual	7
	Parts and Tools Catalogue including CPL & PIL in ILMS/SLMS Format	7
Technical Documentation	Installation Drawings	7
	As fitted Drawings	7
	Applicable Standards Utilised	7
	Test Procedure and Documentation	7

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	Certified Test Reports (FATs, Material Test Certificates, Calibration Certificates, Weight Certificate etc.) & Records (including Type Test Certificate). Class certification	7
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NOTE: 1) Draft copy of the above listed Manuals & Documentations (in hard and soft form) shall be prepared by the supplier and shall be submitted to shipyards for comments & to classification society under copy to MDL/ICG for approval, well ahead of the delivery date of the equipment. Approval on the same shall be given within two weeks of receipt of the Manuals & Documentations complete in all respects & required format.

2) All Manuals & Documentations should be categorised as per the above subject/content description only.

11 **Quality Assurance And Testing:** Quality assurance and testing requirements, pertaining to this equipment should confirm to standard conditions of quality assurance of Nominated classification society as mentioned in Technical Requirement of this SOTR.

11.1 **Design Standards:** Following rules and regulations as applicable shall be met:

- (a) Nominated Classification Society Class Rules.
- (b) International load line reg. 1966 as amended by Protocol of 1988 and any other subsequent amendments.
- (c) IMO/MARPOL-73/78 reg and any further / latest amendments including MS Act 58 and their rules.
- (d) COLREG 72 and any further/ latest amendments.
- (e) IMO /Anti Fouling System.
- (f) International tonnage 1969 and any further/ latest amendments.
- (g) SOLAS 1992 as amended in 2002 and any further / latest amendments.
- (h) Stability standard as per NES 109.
- (i) Naval Magazine Explosive Regulations (NMER).
- (j) Helo deck Regulation as per IRS Rules and Regulations for construction of Coast Guard Vessels (Ch-5, Section -8) or equivalent ABS/LRS/BV/DNV/GL/NK rules.

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- (k) Superior/higher specifications of standard are acceptable subject to proving and satisfactory trial by Yard.

11.2 During execution of the project, following organizations would be associated for ship design, construction, quality control and Ship trials/acceptance:-

- | | | | |
|-----|-----------------|---|---|
| (a) | Design | : | Shipyard / Nominated Classification society |
| (b) | Construction | : | MDL and CGRPT Mumbai, at Shipyard. |
| (c) | Quality Control | : | Nominated Classification society |
| (d) | Ship Trials | : | Indian Coast Guard/Shipyard/Nominated Classification Society. |

11.3 **Quality Standard:** Design and production of equipment should conform to the best worldwide engineering practices, for ensuring high quality, reliability, durability, ease of operation and maintenance for meeting the ship's requirements.

11.3.1 During equipment production the equipment shall be subjected to various stage inspections. Equipment supplier shall ensure high quality of production as per approved quality assurance plan. Quality assurance should meet the specified standards and intent of ISO 9001: 2015 (quality management systems) or its latest version.

11.3.2 During equipment production, any deviation to the QAP/finalized specifications/standards shall be brought to the notice of designated classification society and Shipyard/ICG, along with valid reasons and recommended solution, without any compromise on quality, reliability and performance of the equipment.

11.4 **FATs-(Factory Acceptance Trials)(Acceptance Test Procedure)ATP(QAP document)**

11.4.1 In order to verify its correct assembly and operation, each equipment, shall be subjected to Factory Acceptance Trials as per established proven engineering practice. A detailed FATs program and post-test inspections to demonstrate performance characteristics and guaranteed parameters of the equipment shall be prepared and submitted by the supplier for approval.

11.4.2 All the parameters/performance required to be checked during HATs/SATs must be included in the FATs & duly noted.

11.4.3 During Factory Acceptance Trials, the supplied equipment is to be installed on the test bed and operated in the same way as it will be on board the vessel. Any correction applied for different environmental and installation conditions shall be duly notified to Coastguard/shipyard seeking their approval.

11.4.4 The testing installation shall provide for a mounting arrangement of equal stiffness as expected one for the ship structure where the unit will be seating.

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11.4.5 The schedule for inspection, test & trials should be drawn up in such a way that all inspections including component level inspection, trials of subassemblies, etc., should be, as far as practicable performed at the corresponding stage of manufacture. Detailed measurements should be carried out at the appropriate stage of manufacture.

11.4.6 Factory Acceptance Trials shall be offered to, witnessed & accepted by ICG reps / Classification Society. The FATs shall also be witnessed by shipyard representative.

11.4.7 The supplier shall provide a detailed program of workshop and shipboard tests and post test inspection to demonstrate the performance characteristics and the guaranteed parameters of the equipment for approval by the shipyard/ Indian Coastguard, in the technical offer.

11.4.8 All defects observed or developed during the inspection/ testing are to be rectified free of cost before dispatch to shipyard.

11.4.9 Documentation on equipment FATs procedure is to be submitted by equipment supplier in time bound manner, well in advance for approval by the designated classification society. For conducting equipment official FATs, around 12 weeks advance notice shall be given by equipment supplier to designated classification society/Shipyard/ICG, for participation in FATs. On successful completion of factory acceptances tests, complete FATs report duly certified by the designated classification society, shall be submitted to Shipyard/Indian Coast Guard within 02 weeks' time.

11.5 Harbour Acceptance Trials/Sea Acceptance Trials: On board trials shall be conducted by Shipyard based upon HATs/SATs documentation and ship's trials schedule, which would be planned by shipyard in consultation of equipment suppliers/Trial organizations/Indian Coast Guard. Draft HATs/SATs schedule in accordance to DME 303 D or equivalent International Standards is to be submitted by the firm for concurrence of ICG.

11.5.1 During equipment setting to work and HATs/SATs, equipment suppliers shall assist and offer the respective equipment trials for their successful completion. Equipment testing, tuning and any defect rectification during on board trials shall be undertaken by the equipment supplier in efficient and effective manner.

11.5.2 HATs/SATs documents shall include HATs/SATs schedule, procedure, pre-requisites, data to be recorded, time interval for data recording, formats for data recording, safety and precautions to be observed during trials, estimated time of the trials and all other relevant data/information required for the successful completion of the trials.

11.5.3 Shipyard will prepare test and trial documents, based on the HATs/SATs document submitted by the supplier. The same shall be forwarded to the supplier for their vetting.

11.5.4 HATs/SATs shall be carried out to the satisfaction of ICG as per approved Test and

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Trial document.

11.5.5 Noise and Vibration trials shall be conducted as desired by ICG team / CGRPT. Points for measurement of vibration limits shall be indicated by OEM.

11.5.6 Supplier shall offer / assist HATs and SATs of respective equipment and attest the test and trial document forms on their successful completion.

11.5.7 The major/critical parts of the equipment shall be subject to inspections during the post-CST (SATs) dry docking of the ship.

12 **Maintenance & Logistics:**

12.1 Equipment supplier shall ensure high reliability and low maintenance of equipment.

12.2 While equipment maintenance and repair between major overhauls would be carried out in-situ on-board the ship, major maintenance/overhaul would be undertaken ashore by repair organization.

12.3 Equipment design should therefore ensure ease of maintenance and accessibility to important sub-assemblies/components/accessories.

12.4 Suitable provisions (such as inspection windows, etc.) as feasible, are to be made for ease of in-situ visual inspection of important sub-assemblies/components/accessories for routine inspection, checks and maintenance, without dismantling the equipment assembly/components.

12.5 Equipment supplier shall provide maintenance schedules, planned maintenance intervals and procedure for undertaking maintenance of equipment on-board and ashore.

13 **Spares:** Installation & Commissioning Consumable, On-Board Spares, Base & Depot Spares, special tools, test equipment, etc., are to be recommended by equipment supplier, taking into account operational and maintenance requirements of the equipment. Equipment supplier shall submit comprehensive list of all types of spares & tools under appropriate category along with the technical offer. Different categories of spares & tools shall be supplied, in consultation with Shipyard/ICG.

13.1 Documentation for equipment spares shall include Comprehensive Part List (CPL) & Part Identification List (PIL), for meeting ICG's Logistics Management System (LMS)/Ship's Logistics Management System (SLMS) requirements. All details on spares are to be submitted by equipment supplier in compatible format in electronic media.

13.2 **Installation Tools and Commissioning Consumables:**

13.2.1 **Installation Tools:** Special tools, jigs and fixtures & test equipment required for flushing, setting to work, testing & tuning, on-board trials (HATs/SATs) and post CST inspection of critical internal parts and reassembly of the equipment and its auxiliary systems shall be supplied. Tools shall be ordered along with the main equipment & delivered along with the main equipment.

13.2.2 **Commissioning Consumables:** The Commissioning consumables (first charge like coolants, greases, special oil, filters, gaskets, refrigerant etc.) shall be included in the

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scope of supply. Commissioning consumables shall be delivered before STW of the main equipment, tentative schedule of which shall be indicated in the Tender Enquiry.

13.2.3 An itemised list with cost for the same is also to be indicated in the offer to facilitate their procurement in future, if required.

13.2.4 One set of standard tools adequate for undertaking the maintenance onboard should be supplied along with the offer.

13.3 On Board Spares (OBS):

- (i) The manufacturer's recommended list of On-Board Spares (MRL-OBS) required for servicing and maintenance, including breakdown maintenance for two years of operation after completion of the warranty period, should be included in the scope of supply. A list of On-Board Spares along with the maintenance schedule is to be submitted. The On-Board Spares and special tools shall cater to all on-board maintenance routines and possible repair requirements. Preservation requirements of On-Board Spares, if any, shall be indicated in the offer. The list of On-Board Spares required for auxiliary equipment/system shall also be indicated in the offer.
- (ii) An item-wise list with cost (in LMS format to be submitted in soft copy in Excel) of On-Board Spares, special tools, and test equipment should be as per Annexure "7".
- (iii) In case of any defect or deficiency observed in OBS while handing over to ship crew, the same may be made good by the vendor without any cost implication.
- (iv) All the above OBS spares are to be duly packed in SPTA (Spare parts Tools & Accessories) boxes. For Preferred sizes and material, Refer Annexure "8".
- (v) The Manufacturer's Recommended List of On-Board Spares has to be recommended based on the likely consumption rate of the spares and on the exploitation pattern of the equipment.
- (vi) Firms quoting lesser Manufacturer's Recommended List of On-Board Spares in terms of range and depth will have to make good deficiencies at their cost without any financial responsibility or liability to ICG/MDL within 30 days of intimation to render equipment operational.
- (vii) A certificate of sufficiency of Manufacturer's Recommended List of On-Board Spares is to be submitted by the firm for 03 years of operation of the ship.
- (viii) The Manufacturer's Recommended List of On-Board Spares should also include the spare conforming to Classification Society rule requirements for the vessel.
- (ix) The ICG would have the option to amend the list of OBS proposed by the firm during the TNC of the equipment within the quoted price to ensure its sufficiency, based on its past experience of the exploitation of the same or similar equipment.

13.4 Five-Year Base & Depot Spares/Comprehensive Part Lists: Base & depot spares are to cover spares requirements for major maintenance/overhaul requirements for **5 years** including two refits.

13.4.1 Recommendation for insurance, on long term storage may be indicated. The firm is to submit Comprehensive Part Identification List (CPIL) and Manufacturer Recommended List of Spares (MRLS) for five years exploitation and maintenance.

13.4.2 Itemized list with cost in editable format along with a copy of the maintenance

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schedule for the equipment is to be provided in the offer. Itemized list (in LMS format to be submitted in soft copy in excel) of Base & Depot spares should be as per **Annexure "7"**

- 13.4.3 The B & D Spares shall be procured by MDL on behalf of Indian Coastguard. The B & D Spares shall be ordered at a later date, after ranging and scaling of the Spares done by Indian Coast Guard.
- 13.4.4 The delivery of B&D Spares shall be prior to the Commissioning of the First of Class Ship. Delivery date for the supply of B & D Spares shall be indicated in the Tender Enquiry
- 13.4.5 Quotation for MRL-B&D along with part no for five years exploitation with price to be supplied along with the offer with item wise cost.

14 INDIGENISATION / LOCAL SUPPORT: (Applicable to equipment with import content)

14.1 The supplier is to indicate if the equipment is original OEM supply or manufactured in INDIA under license (specifying the import content). The manufacturer is to engage into a co-operation with a reputed manufacturer of similar equipment's in India and accordingly plan for progressive indigenization.

14.2 In this respect, the equipment manufacturer shall confirm that he will be able to authorize priority works at his works and provide the necessary local support as required to meet the ship construction and trial programme and provide the necessary after sale support to the ICG. Future plans for indigenous production of the equipment associated control/monitoring devices and transfers of technology are to be indicated in the proposal for consideration of Indian Coast Guard Headquarters.

15 Product Support: Equipment supplier is to provide product support for ship's life of 30 years. In case the equipment is likely to be obsolescent, the supplier shall notify the Coast Guard with at least two years prior notice, along with valid reasons and recommended solution.

- (a) The firm/OEM to submit undertaking to provide product support for minimum period of 30 years from date of delivery of the vessel.
- (b) Undertaking for upgrade of software for all equipment's/ sub components for minimum 05 years from the date of delivery of ship. In case of obsolescence within 05 years from date of delivery of the ship, the same to be upgraded without any additional cost.
- (c) Firm to indicate after sales and product support facilities in India with response time for attending defect and providing spares.
- (d) All upgradation and modification carried out on equipment during its life cycle must to be intimated to ICG. Further, any upgradation/modification during guarantee period of the equipment same to be included free of cost.
- (e) Firm should agree to enter into the rate contract / All-inclusive Annual maintenance contract (AIAMC) with ICG for maintenance and supply of spares.

15.1 Operational Cycle: The operating refit cycle of ship is as follows:

- (a) 1st and 2nd Ops refit cycle: Operation cycle of 24 months followed by a refit.

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- (b) 3rd and 4th Ops refit cycle: Operation cycle of 18 month followed by a refit.
 (c) Balance Ops and refit cycle – Operation cycle of 15 month followed by a refit.
 (d) First three refits are short refit (SR) followed by a normal refit (NR). Second NR will be medium repair (MR).
 (e) Short refit is for duration of 04 months. Normal refit is for duration of 05 months and medium refit for duration of 12 months.

16 **Materials:** A component wise material list (with specifications) is to be provided by the equipment supplier. Standard materials for use on board ocean going ships are only to be used. Various materials used shall be in accordance with the stipulated requirements as per international Standard, as stated in the equipment technical specifications. Any deviation from specified materials is to be informed to Shipyard/Indian coast Guard in the Deviation List placed at **Annexure- '2'** with suitable reasons and justifications, subject to the condition that the material meets the requirements for envisaged marine application.

16.1 **A separate declaration stating that no asbestos materials are used in the product is to be submitted along with offer and also post manufacturing during equipment delivery.**

17 **Interchangeability:** Equipment design is to ensure that components and parts having same dimensions and characteristics should be inter-changeable between different units of similar kind in the ship, without affecting the specified equipment performance.

18 **Tally and Diagram Plates:** All major components, including fittings such as valves, cocks, levers, gauges, switches, etc., should be provided with suitable identification tallies for appropriate identification. Tally plates shall be in English language and in SI units. All tallies and diagrammatic plates shall be of SS/ chrome plated. Tallies for safety, caution & warning considerations should be in bold black letters on a fluorescent orange background. Diagrammatic plates indicating details of connections are to be provided / affixed near the terminal box of the motor. Size of tally plates, diagrammatic plates, etc. shall conform to International Standards.

18.1 Arrow marking for direction of rotation of motor shall be provided by supplier. This tally shall be made of SS/ chrome plated and properly secured on the motor.

18.2 Motor details such as HP (kW), Starting Current, Full Load Current, rpm, Insulation, Weight, Maker's Name, Sr. No. of Machine, Year of Manufacturing etc. shall be given in the motor tally plate.

18.3 Danger labels in Red colour with white lettering are to be provided on all electrical equipment operating on 150Volts or higher

18.4 Motor winding terminals ending at Connection Box shall have engraved tally number.

18.5 The diagram plate, which is fixed on the rear side of the front door, shall have complete wiring diagram of the starter with sub-component identification number. The same identification number shall be engraved on the components fitted on the starter.

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18.6 Internal Cable-Cores terminating at the connection terminal strip shall have the same corresponding terminal ferrule no. Fixed / fitted on it.

18.7 Tally of JB/Panel and other equipments internal diagram plate to be prepared by OEM.

18.8 Cable Tallies as per approved system drawing to be prepared by OEM.

18.9 Cable tallies should be supply for both the ends.

19 **Instruction Plates:** Instruction plates listing the starting/shut-down procedure and precautions in brief are to be prominently displayed on the equipment. The Instruction plates are to be SS/ chrome plated. Equipment is to be supplied with a set of instruction plates duly mounted on equipment or supplied loose.

20 **Painting Specification:** Standard painting procedure shall be applicable for suitability for marine environment. Equipment shall be cleaned, degreased and painted with two coats of anticorrosive marine paint & two finish coats. All equipment painting shall conform to CGBR 382 or equivalent International Standards.

21 **Lifting Arrangement:** Equipment components weighing more than 40 kilograms are to be provided with eyebolts/lifting arrangement, for ease of handling/lifting on board the ship or ashore. During transportation/transit of equipment, adequate provisions (such as supports, locking arrangement, jacking, etc.) are to be made for preventing any damage to the equipment & its associated components. Any component requiring special handling shall be clearly marked and appropriate handling instructions shall be provided by equipment supplier. One set of special lifting gear (if any) shall be supplied to shipyard.

22 **Preservation / Conditioning:**

22.1 Equipment supplier is to provide high quality packing for the complete scope of supply along with handling arrangements. The package/container should display clear instructions for stowage, handling, care and accessibility for inspection of equipment preservation condition.

22.2 Equipment shall be supplied with Initial preservation for a period of 12 months for tropical conditions and protected against high humidity. The equipment are to be preserved on delivery as per the standard marine engineering practice. Closing plates/plugs/caps (duly filled with nitrogen gas) are to be provided on all openings.

22.3 For re-preservation requirements, at shipyard or on board ship beyond initial preservation period, suitable provision is to be catered for by equipment supplier. Equipment supplier shall provide re-preservation & upkeep procedure, preservatives/consumables and technical assistance/supervision to the shipyard, as per requirements (if special equipment/Pumps, hoses, fittings, etc. required shall be brought by the supplier along with them for carrying out the preservation on board the ship.

22.4 In the event of storage getting extended beyond a period of 12 months, re-preservation

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shall be carried out on 6 month extensions basis. The conditions and cost shall be stated in the offer for further two re-preservation of 6 months. Details of the preservative used (oils & greases etc.) and the procedure for de-preservation and re-preservation, in shop or on board the ship, shall be indicated in the offer.

22.5 Preservation requirement, procedures and schedule for main equipment, OBS and B & D Spares are to be indicated in the offer.

23 **Packing & Shipping:**

23.1 All equipment shall be adequately packed and protected with supports to ensure adequate protection during all methods of transportation. Each unit within a package/container shall be clearly marked in English for identification. The container shall clearly indicate the commodity description with caution marks, weight, size, etc.

23.2 A separate document giving complete details & instruction for storage, preservation, handling & transportation after delivery shall be supplied & a copy must be included with the shipping document. The supplier should indicate the delivery schedule port of embarkation, transport, packing, preservation, insurance etc.

23.3 The instrumentation, sensors and meters etc. which are fitted on the equipment are to be removed from the equipment and shall be staggered delivered according to shipyard schedule in a separate suitable box/packing during STW.

23.4 Following items shall be packed in separate containers/boxes with proper colour coding (with description) & list of their contents in English for their easy identification and traceability:

23.4.1 Deliverables related to Main Equipment (to be marked in green colour).

23.4.2 Deliverables related to Auxiliary Equipment (to be marked in green colour).

23.4.3 Deliverables related to Installation material and Tools related to Main & Auxiliary Equipment (to be marked in green colour).

23.4.4 Commissioning consumables and Tools (to be marked in green colour).

23.4.5 On Board spares and Tools (to be marked in red colour) in SPTA boxes.

23.4.6 Base & Depot Spares (to be marked in red colour).

23.4.7 Documentation (to be marked in blue colour).

23.4.8 The list of actual deliverables against each of the above serials shall be forwarded to shipyards in soft copy (MS Excel format) with required part nos. within one week of finalization of PNC in order to detail them in the purchase order.

23.4.9 Packing list should give further breakup of items, wherever particular item is quantified by set.

24 **Training :**

24.1 The equipment supplier is to impart training, to ship's crew, on aspects related to operation, installation, maintenance and repair of the equipment.

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24.2 For imparting training, complete training package in hard & soft form (including suitable training material, docket, computer based aids, etc.), is to be provided by the supplier to the participants.

24.3 Training would be conducted by the equipment supplier at Shipyard/ On-board Ship. Training plan will be submitted by the equipment supplier, along with the technical offer. Training is required to cover the following aspects (but not limited to):

- (a) Design and installation
- (b) Operation and trouble shooting
- (c) Control & monitoring
- (d) Upkeep and routine maintenance
- (e) On board maintenance including major repairs and overhaul.

25 Security of Information: The information contained in this document is not to be divulged to any other firm/third party without the prior permission of the Indian Coast Guard and MDL. Adequate measures are to be taken to ensure safe custody of this document.

26 Warranty:

26.1 The equipment along with associated auxiliaries/components shall be warranted by the equipment supplier for the stipulated performance for a period of twenty (20) months from the date of delivery of equipment to MDL or twelve (12) months after planned delivery date (D) (mentioned in subsequent Para) of the ship by shipyard MDL to the Indian Coast Guard, whichever is later. This is to be referred as 'Standard Warranty'.

26.2 During the said period, the equipment supplied shall be warranted against any malfunction, defects, material failure, non-compliance to ordered specifications, sub-optimal performance, design deficiency, poor workmanship and quality. Any expenditure on account of equipment malfunction, repair or supply of spares against warranty defects shall be borne by the equipment supplier. If any defective part is required to be taken back to OEM's factory/works (i.e. importing and re-exporting from Country of origin) for the purpose of service, the entire liability including expenditure towards the same shall be borne by the supplier. The spare parts required / consumed for scheduled servicing & maintenance activities in the period of 'Standard Warranty' shall also be provided by the OEM without any commercial implication.

26.3 If within the period of warranty, the ship and (or) stores and (or) spares are reported by the Shipyard to have failed to perform as per the specifications, the Supplier shall either replace or rectify the same free of charge, maximum within 15 days of notification of such defect by the Shipyard provided that the goods are used and maintained by the Shipyard as per instructions contained in the operating Manual.

26.4 Warranty of the equipment would be extended by user in log book, Spares and all consumables required for warranty repairs shall be provided free of cost by Supplier. All activities including diagnosis, rectification, calibration, transportation etc., required for making equipment serviceable and available would be Supplier's responsibility.



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- 26.5 The Supplier also undertakes to diagnose, test, adjust, calibrate and repair/replace the goods/equipment arising due to accidents by neglect or misuse by the operator or damage due to transportation of the goods during the warranty period, at the cost mutually agreed to between the Shipyard and the Supplier subject to acceptability by the Shipyard. The Supplier shall intimate the assignable cause of the failures.
- 26.6 Supplier hereby warrants that necessary service and repair backup during the warranty period, shall be provided by the Supplier and he will ensure that cumulative downtime period for the Ship and or the fitted equipment /system equipment does not exceed 45 days of the warranty period. Thereafter, the Shipyard reserves the right to make good the defects at suppliers risk and cost.
- 26.7 If the associated equipment and service, spares of 06 NGOPV fails frequently and/or, the cumulative down time exceeds 45 days of the warranty period or a common defect is noticed repeatedly with respect to a particular item/component/sub-component, that complete item/ equipment shall be replaced free of cost by the Supplier within 45 days of receipt of the notification from the Shipyard duly modified/upgraded through design improvement in all equipment supplied/yet to be supplied and Engineering Support Package (ESP) supplied/yet to be supplied. Thereafter, the Shipyard reserves the right to make the defects at Supplier risk and cost.
- 26.8 In case the complete delivery of the ESP is delayed beyond the period stipulated in this contract, then the Supplier undertakes that the warranty period for the goods/stores shall be extended to that extent.
- 26.9 The Supplier warrants that the ship, the associated equipment and service supplied will conform to the Temperature and Humidity conditions as mentioned in this document.
- 26.10 The Supplier agrees to provide back to back warranty of equipment /system or any other item whose specified warranty by the OEM is more than 12 months and shall extend the same warranty to the Shipyard at no additional terms and conditions.
- 26.11 **Extension of Warranty:** Supplier shall mandatorily indicate, in the offer, the annual rate for extended warranty period, in the event of expiry of warranty period as detailed above along with the attendant commercial terms and conditions if any.
- 27 **Planned Ship Delivery date(D):** The planned date for delivery of the Ships to the Indian Coastguard by MDL are tabulated below:

Ship no.	Yard No.	Planned Delivery date
1	16401	May 2027
2	16402	October 2027
3	16403	March 2028
4	16404	August 2028
5	16405	January 2029
6	16406	June 2029

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28 Weight Recording / Weight Certificate: Weights of all components are to be recorded and a suitable certificate shall be submitted, by the equipment supplier. The designated inspection authorities shall countersign such certificates. Format for weight control data sheet, is placed at **Annexure “3”** of this document.

28.1 Net weight of each component is to be recorded in presence of designated inspection authority and the weight certificate is to be submitted by the equipment supplier, along with equipment supply. Format for weight certificate, is placed at **Annexure “4”** of this document.

28.2 The supplier shall have to submit, reasons for variation between allocated weight and actual/certified weight for each and every item, wherever applicable, to Coast Guard and MDL for their consideration and further necessary action.

29 Maintenance Management Software: A Maintenance Management software package for Ship Maintenance, Planned Preventive Maintenance (PPM), Defect Record & Tracking and Maintenance Forecast & Planning as per CG requirements shall be installed and commissioned.

29.1 The software package shall be capable of indicating Maintenance Routines falling due on various equipment fitted on-board and spares requirement, as per OEM promulgated schedule.

29.2 The software will be capable of interlinking on-board spares with actual spares requirement and indicate future requirement to meet Minimum stock level.

29.3 OEM is required to submit the inputs such as routine schedule, spare requirement etc. in the format enclosed at Annexure “9”

30 Technical Assistance:

30.1 The Supplier shall provide the necessary representative(s) **as and when required**, in carrying out inspection and supervise the work that is done on the equipment, during the following phases:

- (a) Preparation for installation of equipment by shipyard.
- (b) Monitoring of proper equipment preservation during storage.
- (c) On-board erection and alignment.
- (d) Setting to Work (including fitment of latest calibrated instrumentation).
- (e) Harbour Trials.
- (f) Assistance in trouble shooting.
- (g) Customer Sea Trials
- (h) Post CST equipment Inspections.
- (i) Final Machinery Trials.
- (j) Assistance in operation during equipment guarantee period.

30.2 The supplier shall indicate total cost for executing all technical assistance activities

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mentioned above, in the price bid. Activity-wise cost break up shall also be given in the price bid, to facilitate the payment on satisfactory completion of the activity.

- 30.3 Shipyard has to progress on ship construction activities, simultaneously on ships of the coastguard project or on ships of different projects. View this, there shall be every likelihood of clash of requirement of technical assistance. In such eventuality, in order to avoid delays on one ship due to similar work requirement on other ship, supplier shall depute their dedicated separate/independent team of supervisors/specialists for required technical assistance, on the required ships. Rotation of supervisors/specialist amongst the various ships/projects shall be avoided.
- 30.4 The supplier shall provide checklist for installation, setting to work, HATs & SATs to the shipyards to ensure the completeness of the activities by shipyards in order to avoid waiting period of the supplier specialists.
- 31 **Receipt Inspection:** Receipt inspection for the major equipment shall be carried out in the presence of OEM rep to verify completeness of the scope of supply and intactness of the supplied equipment. Defective / damaged parts and deficiency, if any, in supply shall be made good by OEM free of cost. OEM shall be intimated the date of receipt inspection.
- 32 **Price:** Price bid shall include cost of all deliverables and services as mentioned in tender. Break-up in percentage of total quoted cost of main equipment for its various components shall be indicated by the supplier. Non-indigenous equipment Suppliers are to indicate the import content in USD/EURO.
- 33 **Compliance Matrix:** Para-wise compliance matrix, including paras which are not applicable, as per the technical specifications (contained in this document) shall be submitted by the equipment supplier along with the technical offer, in the format as per Annexure-5 (preferably in excel sheet). The technical offer received without Compliance Matrix shall be liable for rejection.
- 34 **Technical Offer as Per Shipyard Tender:** Technical part of the offer with respect to the equipment and its associated auxiliaries/components/controls, to be submitted by the equipment supplier in comprehensive, systematic and structured manner, as per the requirements mentioned in this document, including the following (but not limited to) Vendor to submit the check list as per Annexure-6 :
- 34.1 Equipment specifications.
 - 34.2 Equipment performance data
 - 34.3 Characteristics data, curves, efficiency, etc., related to equipment performance
 - 34.4 Outline general arrangement drawings of equipment with footprint, main dimensions, weights and mounting arrangement, with recommended maintenance space.
 - 34.5 Requirement of Ship services (Power rating, Sea/Fresh water, Compressed Air etc.)
 - 34.6 Associated support systems specifications and drawings.
 - 34.7 Interface requirements.



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- 34.8 Relevant drawings with all views and maintenance envelopes.
- 34.9 Control and monitoring system along with complete list of sensors and instrumentation (in structured manner).
- 34.10 Mounting data/details and characteristics
- 34.11 Structure borne and airborne noise performance levels (in graphical & digital format).
- 34.12 Comprehensive list of binding design documentation in structured manner along with time schedule for submission.
- 34.13 Associated electrical equipment specifications and drawings.
- 34.14 Recommended list of installation & commissioning Consumables, onboard spares, base & depot spares, special tools, test equipment, etc., in systematic manner.
- 34.15 Indigenization plan, work-share, MOU / Definitive Agreement / License agreement, technology transfer, product support, etc.; as applicable.
- 34.16 Training plan
- 34.17 Preliminary quality assurance and test plan. (QAP)
- 34.18 Compliance matrix (Para-wise compliance to tender specifications).
- 34.19 Complete Weight breakdown for major components (excluding & including oil).
- 34.20 Requirement of Greases, Oils etc., with their Indian equivalents.
- 34.21 Proposed plan for technical assistance for installation, preservation and commissioning, trials, etc.
- 34.22 List of main and auxiliary equipment included in the standard scope of supply with NCN (NATO Code Nos.).
- 34.23 List of items required for auxiliary systems (shipboard systems), which are essentially, be fitted for proper functioning of main equipment with NCN. Also indicate any of them, which are not supplied along with main equipment.
- 34.24 List of Instrumentation & Diagram.
- 34.25 Clear demarcation between the scope of supply of firm and that of the yard.
- 34.26 Trial and commissioning time of complete system on board.
- 34.27 Delivery time from receipt of order.
- 34.28 List of special tools, instruments, jigs & fixtures & facilities required for lifting, transporting, aligning, installing and commissioning of main equipment and their auxiliaries.
- 34.29 Type approval certificate(if any).
- 34.30 Manufactures may be guided by this document to ensure that their products meet the standards of Installation on Indian coast guard ship.
- 34.31 The drawing & dimensions are for reference purpose only. Vendor to design the equipment based on technical data supplied.
- 34.32 The offer should be strictly conforming to the details indicated in this specification and in the relevant specifications / drawings / documents (All Latest Issues are to be followed).
- 34.33 No omission in the Specifications shall relieve the supplier of his responsibility to ascertain these requirements to perform work & furnish material in accordance with codes specified.
- 34.34 The offer should be complete with all relevant details such as Detailed Technical Specification, Material Specification, Overall Dimensions, Maintenance requirement, Foundation / Installation / Bolting, Storage/ Preservation Details, supported by drawings/documents/data sheets etc.
- 34.35 Any clarification required regarding Technical Specification / Requisition should be

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sought before submission of the offer.

35 **INSTRUMENTATION:**

- 35.1. Safety, control and monitoring devices are to be fitted on equipment as per requirement. All Miscellaneous items are to be fitted as per functional requirement of the system. All piping material with necessary instrument & accessories & Instruments are to be fitted.
- 35.2. Any other instruments & accessories not listed however are required for satisfactory operation as supplier design shall also be part of scope of supply.
- 35.3. If applicable, 100mm dia. pressure and vacuum gauges (complete with needle valves, nuts and nipples) and thermometers should be supplied for the machinery equipment under supply as per technical, specification and these should be indicated in the installation drawings for the unit. Pressure gauge cocks should be provided with vent holes.
- 35.4. All the thermometers should be brass cases. Suitable pockets/sockets should be arranged on the equipment for fitting the pressure gauges and thermometers.
- 35.5. All the pressure gauges and thermometers should be marked in kg/sq.cm or bar and deg. Celsius respectively. All the pressure gauges and thermometers scale ranges should be selected so that the maximum normal operating pressure and temperature respectively will be approx. 75% of the full-scale range.
- 35.6. Temperature sensing should have the facility to allow for instrument removal without impairing the integrity of the system.
- 35.7. Pressure gauges should be provided with valve arrangements to allow for instrument isolation and removal, without impairing the integrity of the system.

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SECTION II: TECHNICAL SPECIFICATION

1. DESCRIPTION:

Design, Approval of the complete system by the classification, manufacturing, supply and commissioning onboard ship of **External fire-fighting system** with following characteristic:

- a. Comprising of 02 numbers of ship's gearbox PTO (Power Take Off) driven centrifugal pumps.
- b. Discharge rate per monitor shall be 1200 m³/hr.
- c. Along with 02 numbers dual purpose foam / water monitors, manually and electrically remote controlled operated and fitted with dual outlets, one having a dedicated water branch pipe fitted with spray deflector and the other with a straight jet stream foam branch pipe, venturi type foam liquid proportional, sea suction valves, metering valves, discharge valves and all necessary in-line isolating valves.
- d. Type approved equipment/system by IACS authority to be offered by the vendor along with unit certification from both ABS and IRS.
- e. If Type approval is not available with the equipment/system, class approved equipment/system to be supplied by the vendor (Class Approval by IRS and ABS both).
- f. Along with necessary equipment, valves, system fitting, nozzles, hoses, auxiliaries, controls, alarms, instrumentation, control panel, joystick panel, tools and on-board spares as per latest ABS and IRS rules requirements as applicable for the class of the vessel.
- g. Quantity : 02 Nos
- h. External FI-FI system shall comply the class notation of FFV-1-NS

2. CONFIGURATION OF EXTERNAL FIRE FIGHTING PUMP WITH PROPULSION GEAR BOX:

- a. Propulsion plant of ship consists of two propelling sets, each one including one marine engine driving a controllable pitch propeller through a reduction gearbox. Both propelling sets are independent. Makes and models of main propulsion engine and reduction gearbox will be intimated later. Main Engine is developing approx. 5000 KW to 5400 KW at 1000 to 1300 rpm in tropical condition.
- b. Each Gearbox will be provided with PTO (Power Take Off) drive for each external fire-fighting pump (meeting class regulations) on primary gear train. A rake of approximately 2.8 degree is provided on shaft line; gearbox and main engine on PORT and a rake of approximately 3.5 degree is provided on shaft line; gearbox; and Main Engine on STBD side, hence external fire-fighting pump on both the sides



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should be suitable for installation at rake . Exact rake angle will be shared at the time of detailed designing of the system. Power rating and rpm required for each external fire-fighting pump to be indicated in the technical bid and same will be indicated to gearbox supplier for finalizing the gear train in gear box and fixing the engine rpm during external fire-fighting operation. Accordingly engine rpm, pitch of controllable pitch propeller and combinatory curve of ship's remote control system will be designed by MDL/ Integrator for carrying out external fire-fighting operations.

- c. Multi disc wet clutch and flexible coupling of heavy duty for external fire - fighting pump will be supplied by gearbox supplier. Multi disc wet clutch for external fire-fighting pumps will be integral with gearbox for engaging and disengaging the external fighting pumps. Supplier of external fire-fighting pump should provide all the interface details of the pump for the clutch and flexible coupling between gearbox and pump. Pump sets are to be supplied as complete units ready to be connected to PTO of gearbox. Axial In and Radial Out pump shall be considered. Suitable 90 degree bend should be supplied for bottom suction from sea tube/ sea chest which will be located in engine room itself.
- d. The main engine manufacturer will carry out torsional vibration calculation for the complete propulsion system. However all the relevant torsional data of external fire-fighting pump required for carrying out TV (Torsional Vibration) analysis should be supplied by external fire-fighting pump supplier.

3. GENERAL REQUIREMENTS OF FIRE FIGHTING PUMPS AND MONITORS:

A. EXTERNAL FIRE FIGHTING PUMPS:

- i. All requirements as per the latest rules of classification society (ABS and IRS) should be met; approval should be obtained for items of external FI-FI pump.
- ii. Each External-fighting pumps duty parameters to be indicated:

Capacity	1200 m ³ /hr(Discharge rate per monitor) (As per FFV-1-NS notation)
Total Head	As per the requirement of class rules
Speed	To be indicated in the offer
Efficiency	To be indicated in the offer
Driver rating required	To be indicated in the offer
Pump shaft seal	Mechanical Type (As the pumps are being installed in engine rooms, seals should have high reliability to avoid any leakage)
Sizes of suction and discharge of the pump	To be indicated in the offer
NPSH required	To be indicated in the offer
Maintenance space required around the equipment	To be indicated in the offer

- iii. Independent sea suction will be provided for each fire-fighting pump. Both the fire-fighting pumps should have equal capacity. Running indications of each

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- external fire-fighting pump will be provided by gearbox, as hydraulic clutch is provided with the Gear Box.
- iv. The direction of rotations of external fire-fighting pumps as seen from pump shaft end (Driving end) will be intimated during detail designing but will be as follows:
 - a. One Pump will be Clockwise and the other will be Counter-clockwise. Pump shaft shall be protected from liquid and is to be encased in grease lubricated ball bearing housing to form integral part of pump casing.
 - v. End connections of the pump should be circular size confirming to DIN STD.
 - a. Suction side: To be indicated in the offer
 - b. Discharge side: To be indicated in the offer
 - vi. Impeller of the pump should be statically and dynamically balanced.
 - vii. Weight of the pumps to be indicated in the offer,
 - viii. Foundation bolts of steel grade 8.8 material complete with nuts and washers to be supplied with pumps.

B. WATER / FOAM MONITORS:

- a. As per class requirements, the vessel will be provided with two numbers water / foam monitors. Each monitor should be suitable for fire-fighting which will be connected to each gearbox PTO driven fire-fighting pumps. Interconnection line with isolating valve shall be provided for port and starboard monitors.
- b. Electric /Electro Hydraulic controls of fire monitors with motor specification as per class requirements. All monitor motors should have ingress protection of IP 56 and should be suitable for mounting on weather deck.
- c. Monitors should be operated both locally and remotely. Electrical control systems are to be provided with overload and short circuit protection. Monitors should contain self- locking gears to prevent uncontrolled movement
- d. Water/ foam monitors should be provided with equal swivels, each with a built in worm and wheel drive with one swivel controlling monitor elevation, the other controls monitor sweep. Both swivels should be hydro-dynamically balanced.
- e. Each monitor to be complete with high quality marine standard material fittings like pedestal, branch pipe etc.
- f. The monitors are to be of robust construction of adequate strength for all modes of operation.
- g. The monitors are to be provided with full stream nozzles and two-stage flow straightener in water pipe.
- h. The monitors should be of single/ double barrelled type where the branch pipe for foam is provided with nozzle aspirator type foam shaper. The foam barrel with built-in agitator to ensure a good foam mix before the foam leaves the barrel.



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- i. The monitor will be controlled by a remote control system. Remote control of monitors should be by Joystick and push buttons on a small portable control box with flexible cable and plug-in connector.
- j. Monitor should have two swivel assemblies to have full control over horizontal (azimuth) and vertical (elevation) movements.
- k. Each monitor should have a built -in worm gear for the control of azimuth sweep and a screw, nut and sector arm for the control of elevation, both of which should be powered by Electric/Electro hydraulic motors. Suitable bearing arrangements for the azimuth swivel and elevation swivel to be incorporated in the monitor.
- l. Remote controlled monitor should be fitted with single/double barrel, one having a dedicated water branch pipe fitted with spray deflector and the other with a straight jet stream foam branch pipe. The water barrel of the monitor should have built-in flow straightner to homogenise the water flow to the nozzle section thus ensuring optimum jet performance. The nozzle should be of well-proven type and the nozzle diameter should be calculated to suit the external fire-fighting piping system for the vessel. A remote operated, knife deflector should ensure wide spread out jet or any other method incorporated in the monitor to be indicated by the firm.
- m. The foam barrel to contain a double action nozzle. This nozzle is to have a central hole, which is surrounded by a ring of smaller holes. The central hole ensures a maximum throw length, whereas the ring of holes around the outside assures good foam. Any other arrangement incorporated in the monitor to be indicated by the firm.
- n. Each monitor will be fitted with mechanical end stops in addition to the proximity switches.
- o. The characteristics of each monitor to be indicated:

Type	Water/ Foam
Monitor Model	To be indicated
Make	To be indicated
Number of Monitors	Two
Capacity	The capacity of each dual water-foam monitor should be 1200 m ³ /h, the minimum distance should be 120 meters to meet FFV-1-NS notation
Inlet pressure	To be indicated
Inlet Flange	To be indicated
Rotation	+175 / -175 degree from datum
Elevation	+75 / -30 degree
Electric motor (Motors to have anti condensation heaters as required)	To be indicated
Reaction Force	To be indicated
Swivels	Ni Al Bronze

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Gearcase	Carbon steel
Worms	Stainless steel to AISI 316L
Waterways	Stainless steel to AISI 316L
Branch pipes	Stainless steel to AISI 316L
Deflectors	Stainless steel to AISI 316L

- p. **Monitor Range:** Monitor minimum horizontal throw shall be 120 meters at monitor elevation of 40-45 degree.
Height: Minimum vertical height is 45 meters at monitor elevation of 70 deg. The same should be demonstrated during the trials.
- q. Foundation bolts of steel grade 8.8 material complete with nuts and washers to be supplied with monitors.

4. GENERAL REQUIREMENTS OF FOAM SYSTEM:

- a. The water/ foam monitor has One barrel for foam and one barrel for water. The change of discharge between the water barrel and the foam barrel should be done with a switch on the operation panel, which changes the position of a valve inside the monitor.
- b. Foam will be supplied from a storage tank through an ejector (so as to add desired amount of foam to the water being discharged), which will be driven by a supply from the pressure side of external fire-fighting pump. The system will be controlled by a series of isolating valves.
- c. The foam system should be suitable for many different foam and dispersant agents which can be used.
- d. An ejector should have a capacity of creating pressure difference between the inlet and outlet. This is due to the change in pressure and velocity within the nozzle. The ejector will suck foam concentrate into the suction side. A small amount of foam concentrate will be mixed with the water and exits the discharge side of the ejector. The ejector should be equipped with a metering valve and check valve. The check valve will be mounted on the suction side of the ejector and prevents water from entering the foam tank if drive water stops. The metering valve should be butterfly valve with a ratio mix scale, which will be set in a position that gives 0 to 6% foam concentrate in the water being discharged from the monitor.
- e. The firm during on board trials of the foam system will set this. To stop and start the drive water, a butterfly valve will be supplied by the firm, which will be installed in the pipelines from the pressure side of the fire-fighting pump to the nozzle in the ejector. During trials of the foam the supplier should calibrate system on-board , before the foam mixing system can be taken into use the metering valve.

5. MATERIAL:

Material used in the manufacture and fabrication should be of highest marine quality and should confirm to ABS and IRS class rule requirements. The materials used should be approved by classification society.

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6. SCOPE OF SUPPLY:

Complete project support including design, drawings with ABS and IRS approval, certificates and consultation, satisfactory demonstration on board the ship is included in the scope of supply of firm for the entire fire-fighting system meeting ABS and IRS rules and also for foam fire-fighting.

Following equipment's / items should be included in the external fire-fighting system and should be supplied by the firm:

- a. 02 nos External fire-fighting pumps (Shaft driven Power take off from propulsion reduction gear).
- b. Each pump should be with following characteristics:
 - i. Radial split type
 - ii. Horizontally mounted, 90 degree suction bend radially and top delivery.
 - iii. Single stage centrifugal pump.
 - iv. Single suction centrifugal pump.
 - v. Each pump to be supplied with suction and discharge pressure gauges (glycerine filled) along with needle valve and mating end connectors. The ports for the suction and discharge pressure gauges to be provided on the suction and discharge flanges of the external fire-fighting pump respectively. Two nos pressure transmitters of range 0-20bar and output signal of 4-20mA to be included in the scope of supply for measuring the discharge pressure remotely in IPMS. Open/Close indication signals for pump suction and discharge valves to be provided, so that the same can be interfaced in IPMS. Shipyard will provide two ports on suction and discharge side for mounting pressure gauges with isolating cocks which are to be supplied by firm. Suitable arrangement to be made on pump discharge for mounting the pressure transmitter.
 - vi. Bearings of the pumps to be self-lubricated.
 - vii. Material of the pumps should be as follows:
 - Pump material shall conform to Class certification and regulation to meet FFV-1 NS notation
 - viii. Each fire-fighting pump should be provided with drain, greasing nipple and shaft guard.
 - ix. Capacity of the pump: 1200 m³/hr with a minimum throwing distance of 120 m (Firm to comply Class notation: FFV-1-NS to the satisfaction of classification society).
 - x. Type of shaft seal: Mechanical shaft seals (of well-established manufacturers fitted to all standard pumps). As the pumps are being installed in engine rooms, seals should have high reliability to avoid leakage.
 - xi. The cooling for the running surfaces of the seal requires certain amount of cooling. The pumps should be designed with passages ascertaining that a small part of the fluid pumped is circulated over the sealing surfaces. Provision should be made to prevent the sealing surfaces from overheating by accidental dry

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running. Firm should forward the details about the sealing arrangement of the pump.

c. Water/ Foam monitor: Qty 02 nos.

Water / Foam monitor suitable for installation on exposed deck should be supplied with following:

- i. Single/double barrel water / foam monitor with all necessary full stream nozzles, deflectors, built-in flow straighteners, built-in agitator for foam barrel, water branch pipe, foam branch pipe.
- ii. Remote control of monitors is to be by electric/ electro hydraulic actuators, electric motors and limit switches. Electronic joystick control for each monitor operation to be provided.
- iii. Equipped with hand wheel operation for both azimuth and elevation swivels for emergency operation, with safety covers for hand wheels having manual override for normal use and with safety interlock with the use of electric motor and hand wheel.
- iv. Monitor range: Min 120 meter (Monitor range will be measured horizontally from the monitor outlet to the mean impact area).
- v. Material: Material shall conform to Class certification and regulation to meet FFV-1 NS notation.
- vi. One junction box per fire monitors to receive ship's connection and mounted on the monitor for further distribution is to be supplied by the firm.
- vii. Maximum azimuth and elevation angle are given below:

Azimuth (Rotation): +175 / -175 degree from a datum

Elevation: +75 degree / -30 degree

Both movements should be adjustable with limit switches and emergency operation by means of hand wheels.

- viii. Each monitor to be supplied with suction pressure gauge (liquid filled) along with needle valve and mating end connectors. The port for the suction pressure gauges to be provided on the suction side of the monitor.
 - ix. Firm should indicate the Bearing arrangements for azimuth swivel and elevation swivel.
 - x. Firm should indicate Sealing arrangements for azimuth swivel and elevation swivel.
- d. 02(Two) numbers switchover unit, electrically remote controlled with necessary water branch pipe, foam branch pipe.
- e. 02(Two) numbers full stream nozzles complete with water guidance profile.
- f. Electric/ Electro hydraulic remote control of fire monitor:

Remote control arrangement of each of the fire monitor will generally comprise of the following:

- i. 01 number electric motor (as per class) for rotation (azimuth)
- ii. 01 number electric motor (as per class) for elevation.
- iii. 01 number electric motorized valve for water/ foam changeover.



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iv. 01 number main control starter panel (as per class) for both the monitors with power supply isolator, isolator switch handle. This panel should also have power supply indication and monitor drives tripped indication. Internally will be reversing contactors for the monitor movements, motor controllers and control circuit transformers. The necessary wiring between the monitors & panel will be carried out by shipyard on the basis of wiring diagram provided by supplier of Monitors. Only Single source of 415V, 3phase & 230V, 50HZ AC supplies will be provided, any other supply required for valves, monitors etc. must be derived from within the starter panel.

v. 01 number MCR control panel for flush mounting, with the following should be provided:

1. Sea suction open / close button with indicator.
2. Discharge valve open / close button with indicator.
3. Clutch in/out switch with indicator
4. By pass discharge valve open / close button with indicator.
5. Deluge valve open/ close button with indicator.
6. Power available (Ready to Clutch) indication.

g. 01 No. wheelhouse control & monitoring panel to be included in the scope of supply preferable having touch screen interface.

h. 01 No. portable control panel having following control to be provided:

- i. Joystick for monitor movements.
- ii. Switches for spray deflectors
- iii. Switches for changeover water/foam with indication.
- iv. Emergency Stop
- v. 1 x 20m cable between the panel & main control panel, with detachable sockets for operating. Details to be elaborate in the electrical drawings

i. 2 Nos. junction box with suitable socket for connecting the portable control panel on weather deck and in wheelhouse should be supplied by firm. Junction box to be used on weather deck should have IP 56 protection.

j. Valves, fittings for entire fire-fighting system and foam system as detailed below will be supplied by the firm per ship set. All valves in the system shall be ABS and IRS class approved as per the requirement. The material of the valve shall be **GM to BS1400 LG/Cast**

DESCRIPTION	QTY (NOS)
Double flanged butterfly valve with electric actuator to be installed at pump suction. ABS and IRS approved and suitable for installation under floor plating in machinery spaces.	02
Butterfly valve on fire pump discharge with electric actuator	02
Butterfly valve near monitor	02
Butterfly valve in-between interconnecting line of both monitors	01
Non return valves in foam suction	02
Foam suction isolating butterfly valves for both foam ejectors	02
Foam liquid metering valve of type butterfly valve with lever and mix ratio	02



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scale	
Foam mixer (i.e. ATP ejector) of jet pump type with no moving parts, material of foam mixer to be Nickel- Aluminium-Bronze. Suction capacity to be indicated by the firm	02
Drive water shut off valve of type manual butterfly valve with lever	02
Foam flushing valve of butterfly type with lever	02
Hose station (As per ABS and IRS rules)	02

- k. Any other valve / fitting not specified under scope of supply, but necessary for the satisfactory operation of the fire-fighting system as per ABS and IRS rules requirement should be indicated by the firm and supplied.
- l. All necessary safeties and alarms as required for any of the equipment's supplied by the firm, as per class rules to be supplied by the firm and list to be forwarded. All the necessary safeties and alarms required for safeguarding the equipment during its operation also to be provided.
- m. Necessary interface /output signals required for Remote operation and monitoring of the Entire system/equipment to be provided by the firm. Control and monitoring system should meet requirements of ACC class notation of ABS and IRS equivalent.

Following indications/ signals should be provided to be integrated with ship IPMS:

- i. Sea suction valve Open / Closed.
 - ii. Pump discharge valve Open / Closed.
 - iii. Discharge Pressure indication.
 - iv. Necessary signals for interlock between sea suction valve, pump discharge valve & PTO clutch should be provided by the firm.
 - v. Any additional signal for remote operation and monitoring to be indicated and provided by the firm.
- n. Based on the submitted binding drawings for the system, MDL will prepare 3D-CAD modelling indicating pipe length, numbers of bends, fittings etc. and forward to firm. Firm should carryout detailed frictional losses calculations to prove the requisite throw is achievable.
- o. Installation and alignment procedure to be provided by the firm.
- p. Mating flanges with necessary fasteners for suction and discharge flanges to be provided.
- q. GA drawing of pump and water monitor (AutoCad format) to be submitted for checking the feasibility of installation.
- r. Proximity switches are to be provided to limit the monitor movements.
- s. The monitor and nozzle system shall be controlled by a self-contained hydraulic system. The entire hydraulic system including electrical driven pump and control valves shall be mounted within a stainless steel cabinet in the close vicinity of monitor.

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Annexure "1"

GENERAL POINT FOR MOTORS AND STARTERS

1. Motors.

- (a) Motors shall be suitable for marine use and conform to latest classification rules of American Bureau of Shipping (ABS) and Indian Register of Shipping classification requirements.
- (b) Motors shall be of standard squirrel cage continuous rated induction type.
- (c) All Motors including Fractional HP motors shall be suitable for 415 Volts, 3 phase, 50 Hz AC supply.
- (d) All Motors shall have class 'F' insulation and totally enclosed with minimum protection of IP-44.
- (e) Motors fitted on the Weather Deck shall be of IP-56 and shall be provided with anti-condensation heaters.
- (f) All motors of 50HP/37.5 KW and above shall be provided with space heaters.
- (g) Interlock is to be provided on starter for switching off the space heater when the motor is switched ON.
- (h) All motors weighing 20 Kgs, and above shall be provided with lifting eyebolts.
- (i) Name plate in English made from engraved brass (black) on weather deck and anodized aluminium (black) in other compartments, indicating motor rated starting current, full load current, rpm, class of insulation, rated voltage, rated running current, number of phases, number of poles and frequency shall be provided.

2. Cable Connections.

- (a) The electric cables shall enter the terminal box on the motor through glands, cable glands to be supplied along with the motor.
- (b) Crippage distance of 20mm space for connecting the cables inside the terminal box should be provided.


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3. **General.**

- (a) All motors of 13.5 HP/10 KW & above shall be provided start-Delta Starters or soft starters.
- (b) Motors below 13.5 HP/10 KW shall be provided with direct on-line starters.
- (c) Fractional HP motors shall be provided with suitable MCCBS/MCBs only.
- (d) Starters to have current protection.
- (e) Starters shall be provided with under voltage protection for motors above/ HP.

4. **Electrical Supply.**

- (a) The starter shall be suitable for 415 Volts, 3 Phase, 50Hz Ac supply.
- (b) The starter shall be provided with Triple Pole Isolator Rotary type incomer.
- (c) MCB/ MCCB.
- (d) ON and OFF Push Buttons.
- (e) Control fuses.
- (f) Motor 'ON' LED indication for Local and remote(As applicable).
- (g) Provision for Auto ON/OFF facility(As applicable).
- (h) Electronic external/separate single phasing preventer to be provided to protect all the three phases of the motors rates 13.5 HP/10KW and above.
- (j) Provision for remote ON-OFF Facility.
- (k) Spare NO/NC contacts for interfacing as required to be provided.
- (l) KED indications with tallies for the following fault condition to be provided.
- (m) Single phasing.
- (n) Overload.
- (p) Thermister Over Heating, if applicable.

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- (q) Contactor with two potential free contacts(spare).
- (r) Timer applicable.
- (s) Over Load Relay (85 to 150%).
- (t) Provision of connecting anti-condensation heater/ space heater.

6. **Thermister and overload Protection.**

- (a) The motor thermal protection system in the starter must detect the abnormal rise in temperature by means of positive temperature co-efficient thermistors (PTCT). Motor should trip due to rise in temperature.
- (b) Timer.
- (c) It should have wide operating range, repeated accuracy and wide time setting.
- (d) Electronic timers should be provided for Star-Delta application.
- (e) Thermal timers to be provided for over lead protection.

7. **Mechanical Construction.**

- (a) The motor starter panel shall be made of 14 SWG Aluminium construction conforming to (A5083 Hill or H 112 or H 116) or (A5086 Hill or H 112 or H 116) or 16 SWG MS Sheet Steel confirming to IS-2026. The panel and assemblies are to be reinforced to withstand the mechanical, electrical (Magnetic) and thermal stresses likely to be encountered in service and are to be protected against corrosion. The panel to be power coated and of dead front type.
- (b) Control Panel fitted on the weather deck shall be made of non-magnetic 16 SWG mat finish stainless steel conforming to IS-316 with IP-56 protection.
- (c) The control panel shall be suitable for bulkheads/in-built eqpt mounting with necessary bolts, nuts, washers, spring – shock mount, screw less terminals etc.
- (d) Suitable locking device will be provided for tixing screws and bolts for preventing them from loosening.



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(e) The panel shall be provided with single hinged door with efficient locking device and door stoppers with Neoprene gasket all around. It shall be suitable for front side maintenance support services.

(f) The bottom plate shall be of removable type for cable entry through cable glands.

(g) Size of panel to be as small as possible considering space constraint on ship.

8. Cable Connections.

(a) The electric cable shall enter the panel from bottom through glands, cable size will be indicated by MDL for supply of cable glands.

(b) The screw less connecting terminals shall be positioned at the bottom of the panel, with all the internal wiring terminated on one side.

(c) Crippage distance of 20mm space for connecting the cables inside the panel should be provided.

(d) 10% spare terminals to be provided.

(e) All electrical supports inside the starter panel shall be of high quality and moisture resistant materials. The contact surfaces and studs of all devices, to which electrical connections are made, shall be tinned.

9. Internal Wiring.

(a) The Internal wiring shall be made by using LFH type copper multi-stranded conductor flexible cables of adequate rating with minimum 1.5 sq. mm. size and has to be neatly dressed and bunched.

(b) All control and auxiliary wirings shall be provided with numbered ferrules at both the ends for easy identification.

(c) A laminated circuit diagram plate to be provided inside the panel at appropriate place. Suitable earthing to be provided for earthing the panel with the ship hull.

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10. **Name Plate.**

- (a) Name plate in English made from anodized aluminium (black) shall be provided for all devices in the panel to identify their function.
- (b) Component tallies shall be provided for all the components inside the starter panel.
- (c) Operating voltage tally shall be provided on the front top. Operating voltage tally shall be in red letters.

11. **Painting Scheme.**

- (a) Starter Panel to be painted with Polyester power coating of RAL-7032 paint.

12. **Spares.**

- (a) Standard spares for unrestricted service meeting the classification should be included in the scope of supply and the list of such spares with Part/Pattern number and quantity in numbers are to be furnished in the offer. These spares are to be supplied as a part of the equipment.

13. **Binding Drawings/Documentation.**

- (a) General arrangement Drg. Of Motors and Starters including weight and dimension.
- (b) Internal Wiring Diagram.
- (c) Calibration Certificate for timers, Thermisters and Overload relays as applicable.

14. **Trials.**

- (a) Acceptance of Motors and Starters will be Subject to Satisfactory Results of Performance tests and routine tests. The tests data offered during Performance tests of Motors in Factory Premises to be documented and forwarded to MDL, as part of the Documentation.
- (b) Tables of Relay Ranges, Fuses, MCBs, MCCB, Timers & SPP for Motor Protection.



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Annexure '3'

WEIGHT CONTROL DATA SHEET

EQUIPMENT DESCRIPTION		EQUIPMENT NO.	
COMPARTMENT		LOCATION	

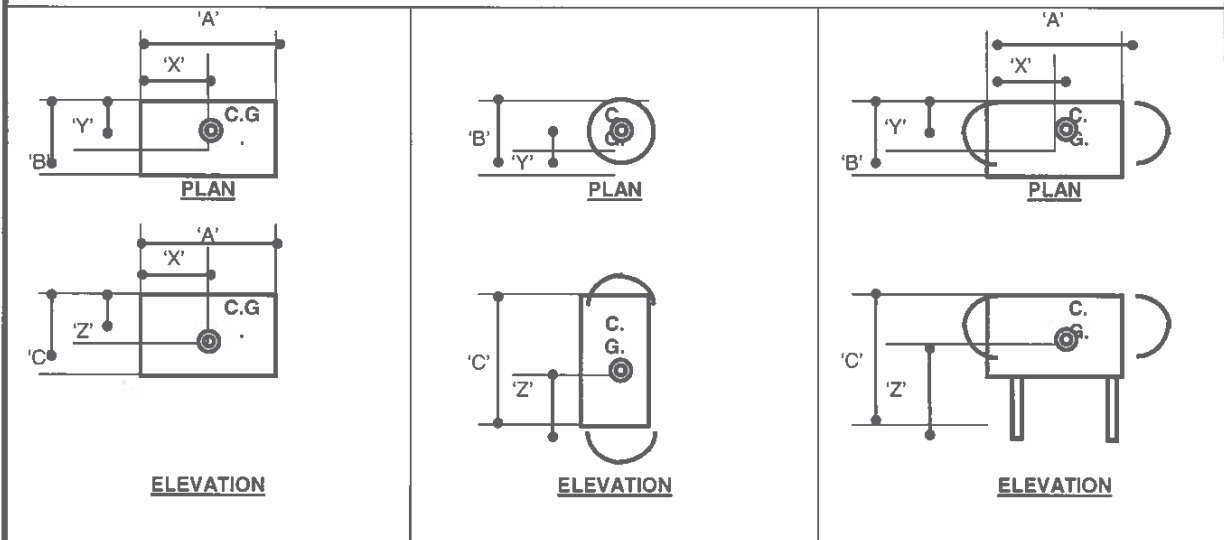
SWBD :

TOLERANCE CODE
 PRELIMINARY EST.
 DESIGN EST.
 M.T.O (CALC)
 WEIGHED
 TOLERANCE ± %

1. WEIGHT (Kg.)

(a)	DRY	Kg ±	%
(b)	FLUID	Kg ±	%
(c)	OPERATING	Kg ±	%
(d)	TEST	Kg ±	%
(e)	TOTAL	Kg ±	%

2. EQUIPMENT DIMENSIONAL DATA (mm) & Co-ordinates of CoG



OVERALL SIZE		CENTRE OF GRAVITY	
'A'		'X'	
'B'		'Y'	
'C'		'Z'	

NOTE :

- ALL OFFERS SHALL INCLUDE THIS DATA SHEET DULY FILLED IN BY THE SUPPLIER (SIGNED, DATED & SEAL AFFIXED).
- ALL FINISHED ITEMS SHALL BE WEIGHED & A CERTIFICATE SHALL BE PROVIDED AS PER ATTACHED SHEET.
- SEPARATE SHEETS SHALL BE COMPLETED FOR EACH INSTALLED EQUIPMENT.
- ORIGIN OF 'X', 'Y' AND 'Z' TO BE INDICIATED.

SUPPLIER'S SEAL

SUPPLIER'S SIGNATURE & DATE



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Annexure '4'

WEIGHT CERTIFICATE			
EQUIPMENT DESCRIPTION:		EQUIPMENT NO. :	
The form shall be completed by Supplier & shall be supplied along with the equipment.			
SUPPLIER'S NAME		Ref. Drg. No.	
ADDRESS		Part No.	
TELEPHONE NO.		EQPT. NO.	
ORDER NO.			
METHOD OF WEIGHING: Supplier shall prescribe Method & Equipment Used:			
	DATE OF LAST CALIBRATION	SPECIFIED ACCURACY REQUIREMENT	
	NOTE :-		
RESULT OF WEIGHING TOTAL EQUIPMENT DRY WEIGHT (Excluding packing, temporary protection etc.)		<input type="text"/>	
ALLOCATED WEIGHT (Weight estimate agreed by purchaser and supplier based on order specs).		<input type="text"/>	
REASONS FOR VARIATION BETWEEN ALLOCATED WEIGHT AND CERTIFIED WEIGHT:			
WEIGHING ADDRESS:	WITNESSED BY		
	FOR SUPPLIER	FOR PURCHASER	
	Representative	Representative	
Date:	Signature / Date & Seal	Signature/Date & Seal	



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ANNEXURE '6'

Checklist with offer:

The supplier to supply as a minimum the following information along with his technical offer:

- 1) Technical Specification of the equipment's.
- 2) Details of all connections to equipment, Vibration details with pattern no, seat details, flange details etc.
- 3) GA drawing of all equipment's, sub-assemblies & accessories.
- 4) Technical parameters of all equipment & accessories.
- 5) Outline drawings of the equipment indicating overall dimensions, C.G. and Maintenance envelope.
- 6) P & ID and E&ID diagram.
- 7) Complete Weight breakdown (excluding & including oil).
- 8) Heat dissipation of the Equipment
- 9) Details of other ship services required.
- 10) Tools required for maintenance.
- 11) Recommended onboard and base spares holding (for 3 year and 5 years operation respectively)
- 12) Manufacturers list of spares for installation & Commissioning.
- 13) Instrumentation List & Diagram.
- 14) Brief on integration of Control System with ship's Integrated Control System.
- 15) Inter-unit cabling diagram clearly indicating each unit/sub-unit and types of cables being used for the system.
- 16) Requirement of Greases, Oils etc., with their equivalents.
- 17) Proposed factory tests and Inspection plan.
- 18) Proposed preservation plan.
- 19) Delivery time from receipt of order.
- 20) Clear demarcation between the scope of supply of firm and that of the yard.
- 21) List of equipment required for installation and operation of the equipment and not supplied by the manufacturer.
- 22) Trial and commissioning time of complete system on board.
- 23) Special tools and test equipment to be supplied for on board maintenance.
- 24) List of main equipment included in the standard scope of supply.
- 25) List of accessories inclusive / not inclusive in the standard scope of supply.
- 26) List of tools & accessories required for installation & commissioning
- 27) Reliability parameters.
- 28) User list of similar equipment supplied by the manufacturer.
- 29) Details of standard and optional factory tests.

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MOTOR:

- 1) Service
- 2) Type of motor
- 3) Power supply – Voltage, Frequency & No. of phases
- 4) Output of motor
- 5) RPM (No load and full load)
- 6) No. of poles
- 7) Full load current
- 8) Starting current
- 9) Starting torque when the ambient temp. is 30oC
- 10) Pull out torque
- 11) Run up time
- 12) Motor Enclosure & Protection provided
- 13) Noise & Vibration level
- 14) Class of insulation
- 15) Method of starting – Remote, local facility & indication
- 16) Type of winding
- 17) Weight of the motor
- 18) Over all dimensions of the motor
- 19) Terminal connection detail
- 20) Efficiency at 100%, 75% & 50%
- 21) Power Factor at 100%, 75% load
- 22) Direction of rotation
- 23) Shaft material
- 24) Lifting arrangement of motor
- 25) Whether RIS unit provided
- 26) Whether heaters are fitted and supply voltage to heater is indicated
- 27) Whether heater supply required
- 28) Frame size
- 29) Method of mounting
- 30) Serial no of machine
- 31) Duty cycle (period of output)
- 32) Particulars of shaft end
- 33) Heat dissipation

STARTER:

- 1) Service
- 2) Type of starter
- 3) Voltage, frequency and No. of phases
- 4) Protection provided
- 5) Enclosure

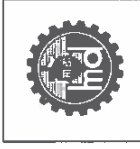


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- 6) Vibration level
- 7) Method of mounting and requirement of mounts
- 8) Method of starting, remote and local control
- 9) Facilities and indication provided.
- 10) Weight and overall dimensions of the equipment
- 11) Rating of the contactors
- 12) Spares provided
- 13) Class of insulation



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Annexure '7'
MANUFACTURER'S RECOMMENDED LIST OF SPARES TOOLS AND SOFTWARE (MRL-OBS)

VESSEL/ EQUIPMENT: 06 NGOPV

Sr No	Eqpt Part No./ Model no./SI No.	Eqpt Description	OEM Name	Vendor Name	Illustrated Spare Part List (ISPL) Reference/ Part No. of	Desc of Spare	Country of Origin	Unit Price	Seller Order No. & Date	Currency Code	Total Qty	VED* Category	Recommended scale for 06 NGOPV	Remarks

MANUFACTURER'S RECOMMENDED LIST OF SPARES (MRL-B&D)

VESSEL/ EQUIPMENT: 06 NGOPV

Ser No	Eqpt Part No./ Model no./SI No.	Eqpt Description	OEM Name	Vendor Name	Illustrated Spare Part List (ISPL) Reference/ Part No. of Spare	Desc of Spare	Country of Origin	Unit Price	Seller Order No. & Date	Currency Code	Total Qty	VED* Category	Recommended scale for 06 NGOPV	Remarks

*VED- VITAL / ESSENTIAL/ DESIRABLE analysis of spares to be carried out by OEM prior to submission to the Buyer.
 Original Equipment Manufacturer (OEM): _____ (Complete Address)



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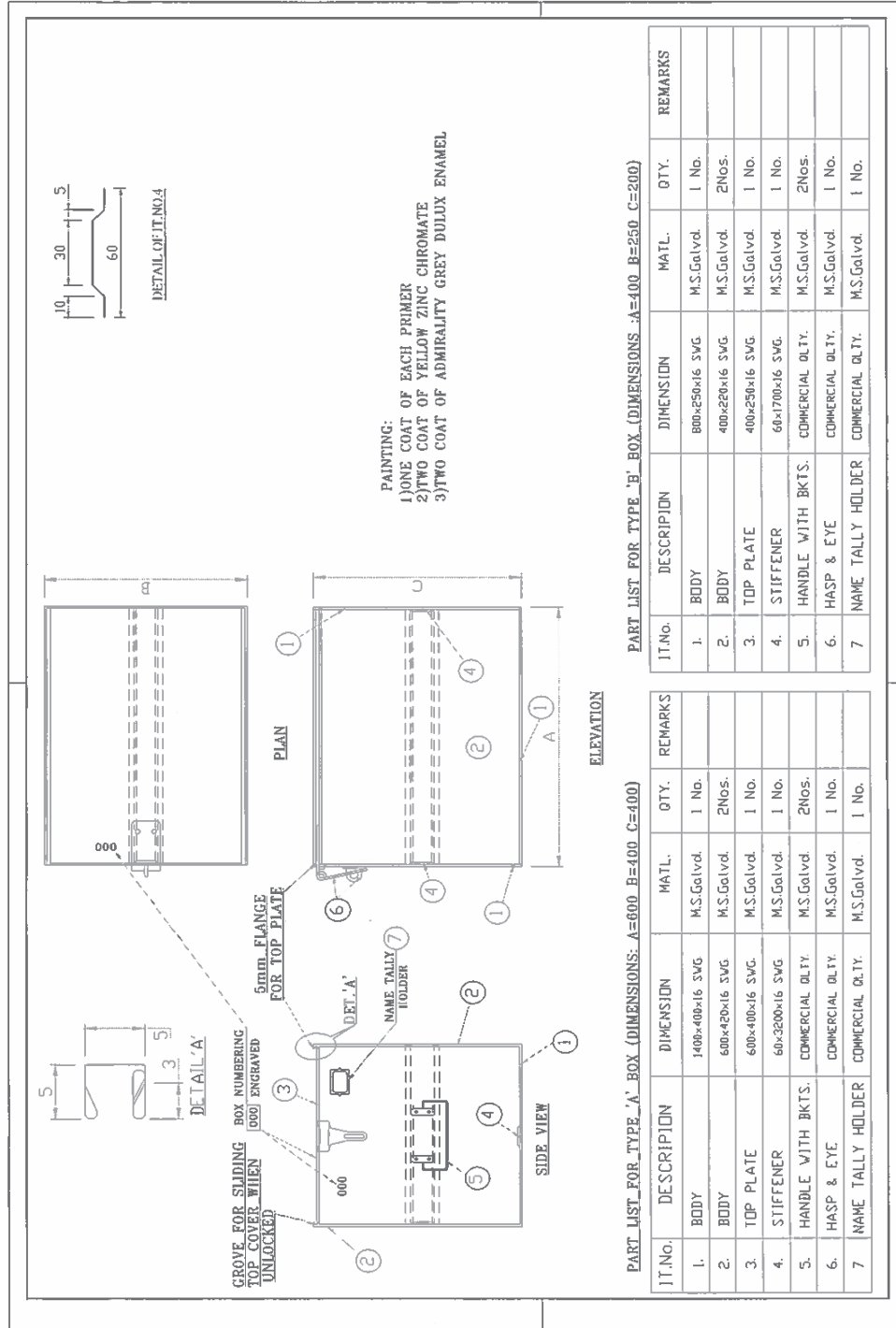
1. Data regarding maintenance spares/stores like lubricants, sealing compound, gases should be given separately giving source of supply.
2. Data furnished as OBD and B&D should also include software backups, as applicable
3. In "Remarks" column following information (if applicable) be given:-
 - a) If an item has a shelf/operational life it will be marked as 'G' and life be indicated
 - b) Matching set of components be indicated.
 - c) Item which can be locally manufactured in India should be marked 'LM'.
 - d) Items which cannot be manufactured in India due to sophisticated design/ technology may be marked as 'SI' (Special Item).
 - e) If a component/assembly is common to other similar equipment offered by the OEM earlier, these should be marked 'CM' and Name of the equipment be indicated.
4. OBS and B&D spares list should be drawn out of the 'Part List' of the equipment, which should be separately given as part of Technical Manuals.
5. If the main equipment consists of other equipment, then OBS and B&D spares list should be prepared for them under proper heads. OBS and B&D spares list is to be prepared as per the maintenance concept of the customer.
6. Items provided along with the equipment as spares should also be included in OBS and B&D list
7. Modules/ Shop Replaceable Unit (SRU) / assemblies should be listed and their components should be included under them so as to relate each item of spare to their module / SRO / assembly.
8. OBS and B&D list for test equipment should also be provided on the similar format.
9. Cost to be indicated in Price bid only.



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Annexure '8' REFERENCE DRAWING FOR SPTA BOX





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Annexure '9'

Maintenance Management Software (MMS) format

Maintenance Interval Schedule	Tasks to be performed	Detailed task description with corresponding equipment image in PDF/ jpeg format	Spares required for performing the tasks			Tools required
			Description	Quantity	Dimension/ weight	
Example:						
Initial 500 Hours	Aux water pump inspect	Check following components for wear and damage 1)Bearings 2)Impeller 3)Seal	Nil	Nil	Nil	1) 1U-7546 chain wrench 2)Engine standard tool kit
	Battery electrolyte level check	1)remove filler caps 2)Add only distilled water if necessary 3)Keep the battery clean 4)clean the terminals with fine grade of sandpaper if required.	Distilled Water	Nil	Nil	
	Engine oil filter change	1)Remove oil filter with 1U-7546 chain wrench 2)Clean sealing surface of filter mounting. 3)Apply clean engine oil to new oil filter gasket 4) intall the new oil filter. Tighten the filter until filter gasket contacts the base. Do no overtight the oil filter.	2) Oil filter gasket	1	Nil	



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Annexure "10"
TIMELINES FOR TASKS AND DELIVERABLES (DURATIONS)

FOR MDL		
Yard 16401/16402/16403/16404/16405/16406		
Activity	From	To
Placement of order		P
1 Binding Data	P	P+3 03
2 QAP	P	P+4 04
3 Manufacturing Drawing	P	P+3 03
4 FAT & Certification	E-12	E-4 08
Equipment Supply per Yard		E
Documentation		As per SOTR
7 Preservation		As per SOTR
(a) In Stores OR		As per SOTR
(b) On- board		As per SOTR
Services Engineers of		As per SOTR
(a) Installation		As per SOTR
(b) STW		As per SOTR
(c) HATs		As per SOTR
(d) SATs		As per SOTR
(e) For Routines		As per SOTR
(f) Training		As per SOTR
9 OBS for two years		As per SOTR

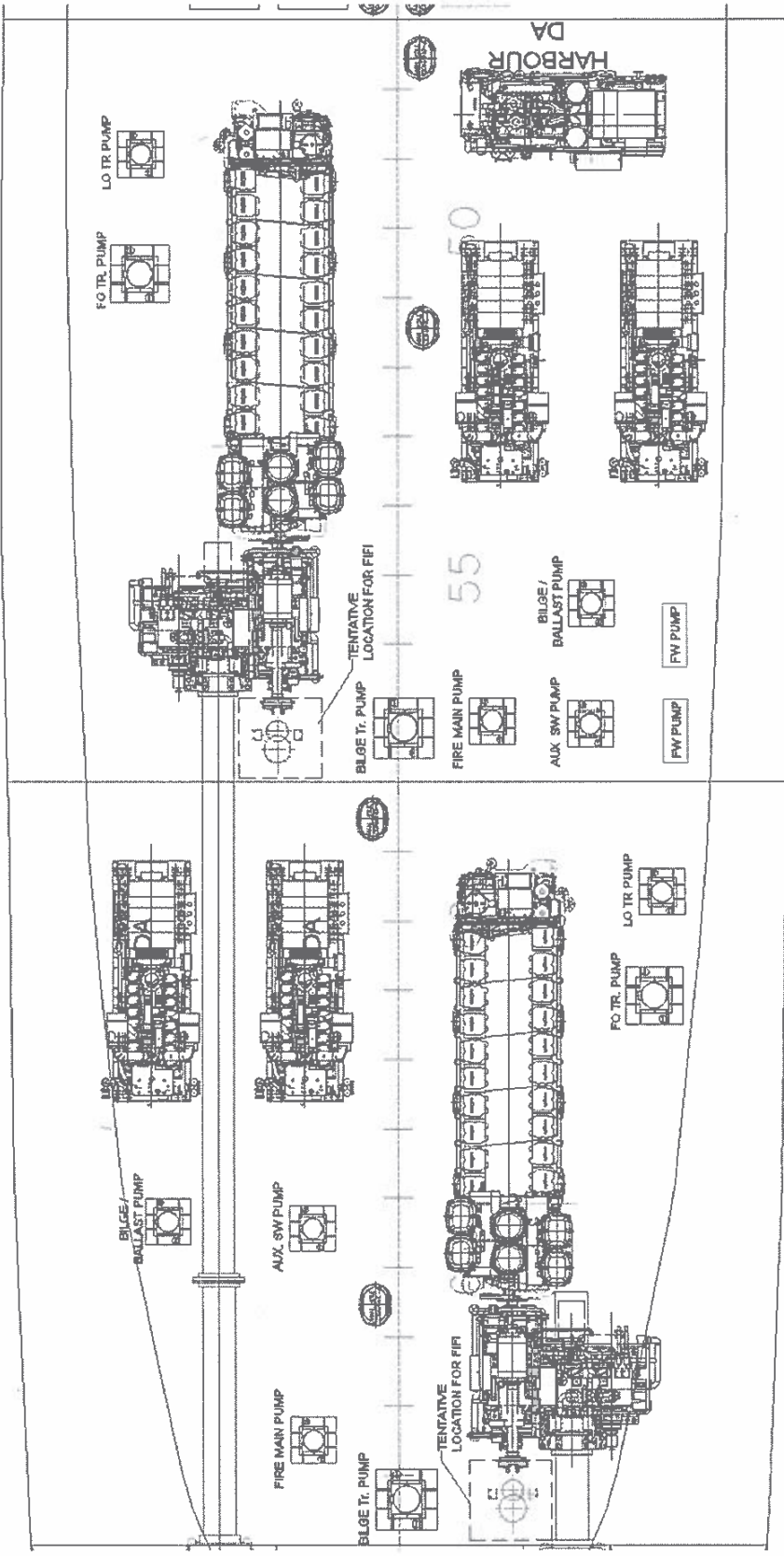
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FOR MDL		
Yard 16401/16402/16403/16404/16405/16406		
Activity	From	To
	As per SOTR	
	As per SOTR	
10	Warranty	
11	B&D Spares	
		Duration (Weeks)

* - These end dates will be indicated as calendar dates in the Purchase Order.
 P- Placement of Purchase Order, E- Equipment Delivery, D- Planned Delivery
Above timelines are tentative, subject to change.

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Annexure: 11 (GENERAL ARRANGEMENT OF ENGINE ROOM)



AFT ENGINE ROOM

FORWARD ENGINE ROOM