



MAZAGON DOCK SHIPBUILDERS LTD.
(A Govt. Of India Undertaking)
Dockyard Road, Mumbai -400 010.

DESIGN OUTFIT
YARD
16401/16402/16403/16404/16405
/16406
ACCOMODATION LADDER

SOTR No.	2032
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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 Centre
STW	-	Setting to Work
CGRPT		Coast Guard Refit and Production team
ICG		Indian Coast Guard



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B. GENERAL CONDITIONS AND 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:

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 12 to 15 knots	5000 NM
Expected ship's life		30 Years
Operating profile	Continuous slow speed	Below 8 knots
	Cruising	12 – 15 knots
	Maximum	23 knots at 92% MCR at full load displacement
Unrestricted continuous rating of Diesel engine, at 45 degree 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:-

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 (1000 mbar)

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:-

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



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3.4	Complement:			
	(a)	Officers	11	
	(b)	Subordinate Officers	32	
	(c)	Others	78	
		Total	121	
3.5	Propulsion Plant Operating Profile / Modes: 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 of around 36 months.			
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: For electrical supplies, in case of different requirements (voltage/frequency, etc.), the equipment supplier shall provide suitable provision (transformer/converter/UPS, etc.).			
	S.No.	SYSTEM	SUPPLIES	REMARKS
	(a)	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.			
5.4	Specific requirements on Noise & Vibration are to be as per respective equipment Technical Specification for Procurement.			
5.5	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			
	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)			



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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. Vibration measurements are to be carried out as per ISO 4868(XII)/latest amendment.																
8	Electrical Equipment Requirements:																
8.1	Requirements for electrical equipment (including Motors & Starters) shall confirm its latest revision / equivalent International Standards.																
8.2	IP Rating for Electrical Equipment: IP rating for associated electrical equipment enclosure is IP 44. Specific IP rating to be as per Technical specification requirement.																
9.	Availability/ Reliability/ Redundancy/ Self Sufficiency:																
9.1	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.																
9.2	Equipment should be robust in design for ensuring high reliability, ease of operation and minimum maintenance.																
10	Binding Drawing & QAP approval: Vendor shall submit the drawings & QAP for approval to designated classification society within 2 weeks of placement of order. 1 set of drawing & QAP to be submitted to MDL as well for review & comments. MDL shall submit the comments on drawings & QAP if any within 1 week. Vendor shall be completely responsible to get drawings & QAP approved from designated classification society within stipulated time. Cost for the drawing & QAP approval by designated classification society shall be borne by vendor. Vendor shall also submit 3-D model of equipment in ".stp" format compatible with Aveva Marine to MDL.																
11	Inspection:																
11.1	All equipment/items to be inspected tested & certified by ABS or IRS or any other classification society as per latest rules & regulations. Cost for the inspection shall be borne by Vendor. All inspection report to be submitted along with main equipment.																
11.2	Equipment should be manufactured to the highest quality and equipment should confirm to class requirement.																
11.3	Receipt inspection shall be done by MDL & CGPRT (Mbi) on receipt of material in stores 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.																
12	Documentation:																
12.1	Following documentation/certificates duly signed by surveyors of designated classification society in hard as well as in soft copy to be submitted by vendor along with equipment.																
	<table border="1"> <thead> <tr> <th>S. No</th> <th>Type of Documents / Drawings</th> <th>Quantity /Yard for 16401</th> <th>Quantity /Yard for 16402-406</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>As Fitted Drawings with part list /Catalogue/ Class approved final GA & manufacturing Drgs with BOM/Installation drawings</td> <td>7</td> <td>3</td> </tr> <tr> <td>2.</td> <td>Technical, Operating, Installation, Testing & Maintenance manual</td> <td>7</td> <td>3</td> </tr> <tr> <td>3.</td> <td>Inspection Certificates, inspection reports of inspection agency, certified test reports, FATS reports, material test reports, load</td> <td>7</td> <td>3</td> </tr> </tbody> </table>	S. No	Type of Documents / Drawings	Quantity /Yard for 16401	Quantity /Yard for 16402-406	1.	As Fitted Drawings with part list /Catalogue/ Class approved final GA & manufacturing Drgs with BOM/Installation drawings	7	3	2.	Technical, Operating, Installation, Testing & Maintenance manual	7	3	3.	Inspection Certificates, inspection reports of inspection agency, certified test reports, FATS reports, material test reports, load	7	3
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	test certificates, certificate for dimensional accuracy, Weight Certificates with position of C.G etc		
4.	Soft copy of all above documents in CD or Pen drive	5	3
12.2	All documents must be in English language only.		
12.3	All drawings & documents shall contain dimensions & other parameters in S.I. units only.		
12.4	Documentation is to be forwarded to the consignee in a separate enclosure, along with supplies.		
12.5	Material/Test/Inspection Certificate is to carry a reference number or any other details so as to relate the certificates with the relevant material.		
12.6	Delivery of main equipment shall be considered completed only on receipt of all approved Manuals & Documentations as detailed in Table -5 above.		
13	Design Standards: Following rules and regulations as applicable shall be met:		
13.1	Nominated Classification Society Class Rules.		
13.2	International load line reg. 1966 as amended by Protocol of 1988 and any other subsequent amendments.		
13.3	IMO/MARPOL-73/78 reg and any further / latest amendments including MS Act 58 and their rules.		
13.4	COLREG 72 and any further/ latest amendments.		
13.5	IMO /Anti Fouling System.		
13.6	International tonnage 1969 and any further/ latest amendments.		
13.7	SOLAS 1992 as amended in 2002 and any further / latest amendments.		
13.8	Stability standard as per NES 109.		
13.9	Naval Magazine Explosive Regulations (NMER).		
13.10	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.		
13.11	Superior/higher specifications of standard are acceptable subject to proving and satisfactory trial by Yard.		
14	Quality Standard:		
14.1	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.		
14.2	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.		
14.3	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.		
15	Factory Acceptance Trials (FATs):		
15.1	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		



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	guaranteed parameters of the equipment shall be prepared and submitted by the supplier for approval.
15.2	All the parameters/performance required to be checked during HATs/SATs must be included in the FATs & duly noted.
15.3	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.
15.4	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.
15.5	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.
15.6	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.
15.7	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
15.8	All defects observed or developed during the inspection/ testing are to be rectified free of cost before dispatch to shipyard.
15.9	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.
16	Harbour Acceptance Trials/Sea Acceptance Trials:
16.1	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.
16.2	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
16.3	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.
16.4	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
16.5	HATs/SATs shall be carried out to the satisfaction of ICG as per approved Test and Trial document.
16.6	Noise and Vibration trials shall be conducted as desired by ICG team / CGRPT. Points for measurement of vibration limits shall be indicated by OEM.
16.7	Supplier shall offer / assist HATs and SATs of respective equipment and attest the test and trial document forms on their successful completion.



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16.8	The major/critical parts of the equipment shall be subject to inspections during the post-CST (SATs) dry docking of the ship.
17	Maintenance & Logistics:
17.1	Equipment supplier shall ensure high reliability and low maintenance of equipment.
17.2	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.
17.3	Equipment design should therefore ensure ease of maintenance and accessibility to important sub-assemblies/components/accessories.
17.4	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.
17.5	Equipment supplier shall provide maintenance schedules, planned maintenance intervals and procedure for undertaking maintenance of equipment on-board and ashore.
18	Spares:
18.1	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.
18.2	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.
18.3	Installation Tools and Commissioning Consumables:
18.3.1	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
18.3.2	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
18.3.3	An itemised list with cost for the same is also to be indicated in the offer to facilitate their procurement in future, if required.
18.3.4	One set of standard tools adequate for undertaking the maintenance on board should be supplied along with the offer.
18.4	On Board Spares (OBS):
18.4.1	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.



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18.4.2	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 3 .
18.4.3	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.
18.4.4	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.
18.4.5	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.
18.4.6	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.
18.4.7	The Manufacturer's Recommended List of On-Board Spares should also include the spare conforming to Classification Society rule requirements for the vessel.
18.4.8	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.
18.5	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.
18.5.1	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.
18.5.2	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"3" .
18.5.3	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.
18.5.4	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.
18.5.5	Quotation for MRL-B&D along with part no for five years exploitation with price validity for 18 months to be supplied along with the offer with item wise cost.
19	Indigenisation/Local Support: (Applicable to equipment with import content)
19.1	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.
19.2	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 program 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.
20	Product Support:
20.1	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.
20.2	The firm/OEM to submit undertaking to provide product support for minimum period of 30 years from date of delivery of the vessel.
20.3	Undertaking for upgrade/currency of software for all equipment min 05 years from date of



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	delivery of vessel. In case of obsolescence within 05 years from date of delivery of the Vessel, the same to be upgraded without any additional cost.
20.4	Firm to indicate after sales and product support facilities in India with response time for attending defect and providing spares.
20.5	All upgradation and modification carried out on equipment during its life cycle must be intimated to ICG. Further, any upgradation/modification during guarantee period of the equipment same to be included free of cost.
20.6	Firm should agree to enter into the rate contract / All-inclusive Annual maintenance contract (AIAMC) with ICG for maintenance and supply of spares.
21	Operational Cycle: The operating refit cycle of ship is as follows:
21.1	1st and 2nd Ops refit cycle – Operation cycle of 24 months followed by a refit.
21.2	3rd and 4th Ops refit cycle – Operation cycle of 18 month followed by a refit.
21.3	Balance Ops and refit cycle – Operation cycle of 15 month followed by a refit.
21.4	First three refits are short refit (SR) followed by a normal refit (NR). Second NR will be medium repair (MR).
21.5	Short refit is for duration of 04 months. Normal refit is for duration of 05 months and medium refit for duration of 12 months.
22	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- '1' with suitable reasons and justifications, subject to the condition that the material meets the requirements for envisaged marine application. 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.
23	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.
24	Tally, Instruction and Diagram Plates:
24.1	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.
24.2	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.
24.3	Motor details such as HP (kW), Starting Current, Full Load Current, rpm, Insulation, Weight, Maker's Name, Sr. No. of Machine, Year of Manufacturing, Weight of Equipment, IP Rating of the equipment etc. shall be given in the motor tally plate.
24.4	Danger labels in Red colour with white lettering are to be provided on all electrical equipment operating on 150Volts or higher
24.5	Motor winding terminals ending at Connection Box shall have engraved tally number.
24.6	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



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	identification number shall be engraved on the components fitted on the starter.
24.7	Internal Cable-Cores terminating at the connection terminal strip shall have the same corresponding terminal ferrule no. Fixed / fitted on it.
24.8	Tally of JB/Panel and other equipment internal diagram plate to be prepared by OEM.
24.9	Cable Tallies as per approved system drawing to be prepared by OEM.
24.10	Cable tallies should be supply for both the ends.
24.11	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.
25	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.
26	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.
27	Preservation / Conditioning:
27.1	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.
27.2	Equipment shall be supplied with Initial preservation for a period of 12 months for tropical conditions and protected against high humidity. The equipment is 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.
27.3	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.
27.4	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.
27.5	Preservation requirement, procedures and schedule for main equipment, OBS and B & D Spares are to be indicated in the offer.
28	Packing & Shipping:
28.1	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.
28.2	A separate document giving complete details & instruction for storage, preservation, handling & transportation after delivery shall be supplied & a copy must be included with the



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	shipping document. The supplier should indicate the delivery schedule port of embarkation, transport, packing, preservation, insurance etc.
28.3	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.
28.4	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:
	(i) Deliverables related to Main Equipment (to be marked in green colour).
	(ii) Deliverables related to Installation material and Tools related to Main & Auxiliary Equipment (to be marked in green colour).
	(iii) Commissioning consumables and Tools (to be marked in green colour).
	(iv) On Board spares and Tools (to be marked in red colour).
	(v) Base & Depot Spares (to be marked in red colour).
	(vi) Documentation (to be marked in blue colour).
28.5	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.
28.6	Packing list should give further breakup of items, wherever particular item is quantified by set.
29	Training:
29.1	The equipment supplier is to impart training, to ship's crew, on aspects related to operation, installation, maintenance and repair of the equipment.
29.2	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.
29.3	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):
	(i) Design and installation
	(ii) Operation and trouble shooting
	(iii) Control & monitoring
	(iv) Upkeep and routine maintenance
	(v) On board maintenance including major repairs and overhaul.
30	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.
31	Warranty:
31.1	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 succeeding Para) of the ship by shipyard MDL to the Indian Coast Guard, whichever is later. This is to be referred as 'Standard Warranty'.
31.2	During the said period of 'Standard Warranty', 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



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	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.																					
31.3	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.																					
32	<p>Planned Ship Delivery date(D): The planned date for delivery of the Ships to the Indian Coastguard by MDL are tabulated below:</p> <table border="1"><thead><tr><th>Ship no.</th><th>Yard No.</th><th>Planned Delivery date</th></tr></thead><tbody><tr><td>1</td><td>16401</td><td>July 2027</td></tr><tr><td>2</td><td>16402</td><td>Dec 2027</td></tr><tr><td>3</td><td>16403</td><td>May 2028</td></tr><tr><td>4</td><td>16404</td><td>Oct 2028</td></tr><tr><td>5</td><td>16405</td><td>Mar 2029</td></tr><tr><td>6</td><td>16406</td><td>Aug 2029</td></tr></tbody></table>	Ship no.	Yard No.	Planned Delivery date	1	16401	July 2027	2	16402	Dec 2027	3	16403	May 2028	4	16404	Oct 2028	5	16405	Mar 2029	6	16406	Aug 2029
Ship no.	Yard No.	Planned Delivery date																				
1	16401	July 2027																				
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3	16403	May 2028																				
4	16404	Oct 2028																				
5	16405	Mar 2029																				
6	16406	Aug 2029																				
33	<p>Weight Recording / Weight Certificate: 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 '2' of this document.</p> <p>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.</p>																					
34	Maintenance Management Software:																					
34.1	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 by MDL.																					
34.2	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.																					
34.3	The software will be capable of interlinking on-board spares with actual spares requirement and indicate future requirement to meet Minimum stock level.																					
34.4	OEM is required to submit the inputs such as routine schedule, spare requirement etc. in the format enclosed at Annexure-4.																					
35	Technical Assistance:																					
35.1	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.																					



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	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.
35.2		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.
35.3		Shipyards 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.
35.4		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.
36		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-1 (preferably in excel sheet). The technical offer received without Compliance Matrix shall be liable for rejection.
37		Check List of Documents to be submitted with Offer:
37.1		Compliance matrix as per Annexure 1
37.2		Preliminary drawings for Accommodation ladder and associated fittings indicating clear over all dimensions & weight data.
37.3		Recommended list of OBS & B & D spares
37.4		Lead time for delivery of Material post placement of order.
37.5		Documents in support of Technical prequalification criteria specified in tender document.
37.7		Type approval certificate from any class if available.
37.8		Load test certificate of Accommodation Ladder with SWL and specification of wire rope including details of motor and reduction gear box to be indicated in technical offer.
37.9		Shipyards scope requirements If any



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SECTION – II
TECHNICAL REQUIREMENT

1.	DESCRIPTION OF EQUIPMENT: ACCOMODATION LADDER
2.	SCOPE OF SUPPLY:
2.1	02 Numbers of Marine quality Aluminium alloy Accommodation ladder along with davit for hoisting the ladder, motor, control panel, starters and any other items required for satisfactory operation.
2.2	Installation on board ship: -Erection, alignment, Trials & Commissioning of Accommodation Ladder on board ship to the satisfaction of MDL & Coast Guard team.
2.3	On Board Spares as per Para 18.4 of Section-I
2.4	B & D spares as per Para 18.5 of Section-I
2.5	Documentation as per Par 12 of Section-I
2.6	Training
3.	Technical Specifications:
3.1	Accommodation ladder for embarkation and disembarkation shall be designed, manufactured and tested in accordance with ISO-5488-2015, shipbuilding: accommodation ladder and IMO SOLAS MSC 86/convention 1331 and Reg. 11- 1/3-9 of 1974 SOLAS convention adopted by MSC 256(84) (for construction of accommodation ladder).
3.2	The construction and test of accommodation ladder winches are to be in accordance with applicable international standards such as ISO 7364:1983 "Shipbuilding and marine structures – deck machinery – accommodation ladder winches".
3.3	Side stringers of channel section with suitable braces under for rigid construction.
3.4	Fixed steps secured between channel stringers to provide good foot holds between horizontal and 50 degrees inclination.
3.5	Each ladder is to be fitted with an upper platform of length 600 mm to provide direct access between the ladder and ship's deck. The upper platform is to be turn able type and constructed of mild steel to IS 2062 and galvanised after construction.
3.6	Al.-alloy accommodation ladder will be hinged to upper platform. The lower platform is to be constructed of al.-alloy and is to be adjustable type to suit the rake of the ladder.
3.7	Collapsible type, self-locking stanchions on both sides of the ladder with top and half Height rails.
3.8	Hardwood chafing pads on each side of the foot of the ladder.
3.9	Rubber roller fitted on the ladder adjacent to the ship.
3.10	Rubber typed wheels at the foot of the ladder for resting ladder on quay.
3.11	Turn able upper platform of mild steel construction galvanised after fabrication and fitted. The platform to be capable of rotation through 180 degrees, complete with double angle under stay and chains. The hinge pin/shaft of the platform to have provision for connecting suitable torque tube with ladder davit arm.
3.12	DAVIT ARM: The arm is to be constructed of M.S. with M.S. Hinge pin and C.I. sheaves fitted with bronze bushes. The arm to be pivoted on the foot bearing and should be suitable for deck mounted winch. Davit pivot shaft to have provision for connection of torque tube to ladder top platform.
3.13	WINCH: Under deck mounted electric winch to comprise of an electric motor of suitable rating to handle accommodation ladder at 4.5 M/min. (APPROX). The winch is to be totally enclosed type with: (a) Gears running in an oil bath (b) Electro Magnetic brake. (c) The motor rating to be indicated in the offer.
3.14	Reduction gear unit, wire drums to be directly coupled to output shaft of winch.
3.15	Provision for hand operation in cases of power failure to be included in the winch.



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3.16	All necessary items of rigging which are required for proper stowage and handling of each ladder.
3.17	All electrical parts (control panels, etc) should be IP56 rated.
3.18	For general technical requirements for electric motor and starters, refer Annexure '5'.
3.19	The equipment shall be supplied with all its accessories including interconnecting cables, connectors, nuts bolts consumables, etc. required for installation and satisfactory performance of the equipment.
3.20	If any special tools and calibration kits are required for erection, commissioning and maintenance of the equipment, they are required to be supplied along with the equipment.
3.21	Whenever the type/model of equipment mentioned in the quotation is out of production and superseded, the latest version is to be supplied without any cost implications.
3.22	Item to be supplied complete in all respects to the entire satisfaction of inspection authority.
3.23	Vendor shall depute trained & qualified persons for installation of accommodation ladder on board. All material required (seating, cables, consumables, tools, hardware, etc) for installation activities shall be in vendor scope.
3.24	Emergency hoisting / lowering lever shall be furnished for emergency operation of the accommodation ladder.
3.25	Each step is to be designed for SWL of 100 kg.
3.26	Equipment Talley Plate including details of SWL is to be fitted with all details.
3.27	LOCATION: 20 Dk or Quarter deck at between Frames 74-80 (Port & Stbd).
3.28	DIMENSIONS:
3.29.1	The approximate single length of the ladder shall be 3.5M. Exact length is to be decided by vendor and it is to be such that the lower platform should be positioned at maximum 600 mm above light water line when ladder is fully lowered.
3.29.2	Width between stringers to be minimum 600 mm.
3.29.3	The maximum angle of inclination from horizontal is 50°
3.29.4	The distance between steps should be 300 mm.
3.30	WEIGHT:
3.30.1	The approximate weight of each set of ladder complete with winch, control panel etc. is to be restricted to minimum without compromising performance. Total weight of each set of ladder complete with all accessories, operating winch and foundation bolts must be indicated in the technical offer considering the space restriction.
3.30.2	All efforts should be made to minimize the weight and dimensions of the equipment as far as practicable, without impairing the functional parameters.
3.30.3	Net weight of Accommodation ladder is to be recorded in the presence of inspection Agency on the "Weight Certificate" as per (APPENDIX-2) enclosed. The above certificate is required to be submitted along with the supply of item.
3.31	SHELL SIDE OPENING:
3.31.1	The approximate size of shell side opening required for fully operation of accommodation ladder should be indicated in the technical offer.
3.31.2	The shell cut opening will be provided in such a way that it will be flushed with ladder in stowed position and uphold stealth properties of the ship. Shell side opening has catered in such a way that there will not be any opening identified from outside of the ship when ladder is stowed position.
3.27.3	It may be noted that the location of accommodation ladder and handling arrangement with accessories are to be such that it should not foul with opening at any stage of the operation from stowed position to lowered position.
3.32.4	The opening should be catered with adequate space for free movements of the ship staff during embarkation and disembarkation. A minimum of 1300 mm clear passage has been provided between the accommodation ladder arrangement and the bulkhead to allow free movement of men and material. No handling equipment is to be installed in this passageway.



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3.33	MATERIAL:
3.33.1	The ladders are to be constructed of aluminium sections conforming to A 6061 T6 or A 6082 T6 aluminium alloy chequered plate to A 5083 H111 / 112 /116 or A 5086 H111 /112 /116 or Indian equivalent.
3.33.2	If Indian equivalent specification is used the same must be indicated in technical offer.
3.33.3	Fixed steps between stringers are to be of Al-alloy chequered plate of specification as stated above to get foot hold.
3.33.4	All SS material to conform to AISI 316.
3.33.5	All M.S material to confirm to ABS GR A/B or IS 2062.
3.34	Painting: The Accommodation ladder and control gear are to be cleaned, degreased and treated for anti-corrosion and finally painted with two coats of pure white anti-corrosive finish paint (RAL code 9010). Lubricating and greasing of all necessary parts of the equipment, as necessary, is to be done to prevent corrosion, as per manufacturer's standard, before despatch of the equipment.



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ANNEXURE - 1

(To be filled in by the **SUPPLIER** & submitted as part of the Offer)

COMPLIANCE MATRIX

With reference to the subject Requisition received along with the MDL Inquiry and our QUOTATION No. _____ Dated _____ we hereby confirm / clarify the following :

TSP Para No	Complied / Not Complied	Offer Reference (Page & Para No.)	Deviations with reasons (if any)
1			
2			
3			
4			
5			
6			
7			
8			

The Bidder should fill in this form for the deviations of his bid from the requirements as stated in the TSP. If no deviation is required, bidder should fill in "NIL" in the deviation column. Deviation listed other than deviation form shall not be considered.

BIDDER'S COMPANY SEAL

BIDDER'S SIGNATURE & DATE



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Annexure – 2

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 - 3
MANUFACTURER'S RECOMMENDED LIST OF ON BOARD SPARES (MRL-OBS)

VESSEL/ EQUIPMENT: 01 VESSEL

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 NGOPV Ships	Remarks

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

VESSEL/ EQUIPMENT: 01 VESSEL

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 NGOPV Ships	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.



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Annexure - 4
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 - 5

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) / 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 aluminum (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 alongwith the motor.
(b)	Cripping distance of 20mm space for connecting the cables inside the terminal box should be provided.
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.
(i)	Provision for remote ON-OFF Facility.
(j)	Spare NO/NC contacts for interfacing as required to be provided.
(j)	KED indications with tallies for the following fault condition to be provided.
(k)	Single phasing.
(l)	Overload.



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(m)	Thermister Over Heating, if applicable.
(n)	Contactor with two potential free contacts(spare).
(o)	Timer applicable.
(p)	Over Load Relay (85 to 150%).
(q)	Provision of connecting anti-condensation heater/ space heater.
5	Thermistor 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.
6	Mechanical Construction
(a)	The motor starter panel shall be made of 14 SWG Aluminum 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.
(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.
7	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)	Cripping 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.
8	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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9	Name Plate
(a)	Name plate in English made from anodized aluminum (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.
10	Painting Scheme
(a)	Starter Panel to be painted with Polyester power coating of RAL-7032 paint.
11	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.
12	Binding Drawings/Documentation
(a)	General arrangement Drg. Of Motors and Starters including weight and dimension.
(b)	Internal Wiring Diagram.
(c)	Calibration Certificate for timers, Thermistors and Overload relays as applicable.
13	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.

