

HINDUSTHAN SHIPYARD LIMITED, VISAKHAPATNAM – 530 005, INDIA		
ENQUIRY TECHNICAL SPECIFICATION (ELECTRICAL) AND SCOPE OF SUPPLY OF MAIN ENGINES FOR 2 Nos. 50 T BOLLARD PULL TUGS FOR KANDALA PORT TRUST		
VESSEL NOS. – 11173-74		
<u>PART C – ELECTRICAL PART</u>		
Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
1	GENERAL	
1.1	The electrical equipment shall be suitable for operation on the supply voltage available on board the ship as indicated below:	
1.1.1	All the driving electric motors and other power loads shall be designed for operation on 415 V 3 phase, 50 Hz supply 3 wire system(Neutral does not exist in the supply system).	
1.1.2	Oil Mist Detector, Alarm Signaling system shall be suitable for operation on 230 V Single phase 50 Hz supply.	
1.1.3	Power supply for the indication lamps of automatic Electropneumatic remote control equipments , stop magnet of the governor shall be suitable for operation on 24V DC.	
1.1.4	All the Electrical control and protective gear shall be designed to operate on the corresponding voltages available. If a particular equipment requires a voltage other than those available ,above suitable gear, such as transformers and / or rectifiers , etc. , as necessary shall also be included in the supply without extra cost.	
1.2	All the Electrical equipments shall operate efficiently under voltage fluctuations and under frequency fluctuations as per the Rules and Regulations specified in PART A- General part.	
1.3	Special type of Electric cables, if any required for the operation of any particular equipment shall be included in the scope of supply. Otherwise HSL cable of following specification will be utilised: - Copper conductor XLPE / EPR (E85) Insulated, PVC inner sheathed , G.I. Wire braided PVC overall sheathed 0.6 / 1 kV. Grade confirming to IEC-92-3.	
1.4	Minor modifications at site as and when required for the operation of automation and other associated equipments shall be incorporated without extra cost.	
1.5	Items not indicated in this specification , but are required for the system completion and required as per Rules and Regulations shall be supplied without any extra cost.	
1.6	Main Engine suppliers shall coordinate with SRP propulsion system suppliers and also the Ship's Central Alarm Monitoring System suppliers for Interface drawings and for Integration of these systems for satisfactory functioning.	
1.7	All Electric Panels / DB's shall be provided with diagram plates, clearly showing connections with terminal markings as on the equipment and they shall be secured on the underside of the cover of the panel / DB's.	
1.8	One (1) Set of special cables, lugs are to be supplied.	
1.9	Relays and Miniature Circuit Breaker of various capacity fitted shall be of M/s Siemens make.	
2.1	MOTORS: Any Electrical Motor's and Starters provided shall conform to the following specifications.	
2.1.1	The motors shall be of marine type and reputed make and shall conform to the latest requirements of Classification Societies and I.E.C. Standards. The motors driving the pumps shall have sufficient power rating to drive the pump without over loading under any condition.	
2.1.2	All motors shall be designed for operation on 415V, 3 – Phase, or 230V, 3-Phase / single phase, 50Hz supply . (Neutral does not exist in the supply system).	

Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
2.1.3	All motors shall have push button, direct on line starting gear.	
2.1.4	All motors above 10 HP rating to be provided with star-delta starters.	
2.1.5	All motors shall be of squirrel cage induction high torque smooth acceleration type. Rating of all motors to be of continuous rating.	
2.1.6	All motors to be of drip proof self ventilated enclosures (IP-44).	
2.1.7	All motors to have class - "F" tropicalized insulation.	
2.1.8	Bearings of motors to be ball bearing and those of vertical type motor to be radial ball bearings or an angular contact bearing considering thrust load. Pre-lubricated sealed type bearing to be used as far as practicable depending upon manufacturer's standard. All bearings except sealed type to be greased nipples.	
2.1.9	Motors shall be provided with water proof terminal box as per suppliers standard with all the wires brought into the box and terminated in standard connecting terminals. All connecting terminals shall be complete with Nuts, Spring Washers, etc. Which shall be treated against corrosion. The terminal box shall also be provided with removable cover.	
2.1.10	CABLE ENTRY Appropriate number of water tight brass cable entry glands shall be provided on the terminal box for receiving the electrical cables, details of which will be furnished on receipt of drawings.	
2.1.11	Interior painting colour to be according to Maker's standard.	
2.1.12	Identification name plate to be provided on each motor and standard data such as Maker's Name, SI.No, Voltage Rating, KW, RPM, FI, Amps, Weight, etc. in English to be available on Name plate. The Name Plates shall be made of anti-corrosive and non-inflammable material.	
2.1.13	Following technical data pertaining to the motors shall be furnished after placement of order. a) Maker's Name b) Rated Output HP/KW and Rating RPM c) Full Load Current/Starting Current d) Full Load Torque/Starting Torque e) Accelerating Time f) Power factor at full load and efficiency. g) Actual power output at full load of pump h) Thermal over load relay setting required	
2.2	STARTERS	
2.2.1	CONSTRUCTION	
2.2.1.1	Each starter shall be of direct-on-line type (for motors above 10 HP Star-Delta) and shall be of totally enclosed, IP-44 drip proof sheet steel protected, self-ventilated, dead-front construction suitable for bulkhead fixing shall be provided. The starter shall have front opening hinged door and provided with service name plates on the front side of the door and wiring diagram inside the door and all working parts shall be accessible within this door.	
2.2.1.2	All the wiring cables shall be of copper only.	
2.2.1.3	All the outgoing wiring shall be terminated at the bottom and suitable terminals shall be provided.	
2.2.1.4	The size of the starter shall be kept to a minimum. The dimensions of the starters and fixing arrangements shall be indicated in the drawings.	

Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
2.2.1.5	All the live parts shall be properly protected against accidental contact.	
2.2.1.6	Starter shall be provided with appropriate number of water-tight brass cable entry glands.	
2.2.2	CONTROL GEAR IN EACH STARTER	
	Control gear shall be of reputed Makes. The following features shall be equipped	
2.2.2.1	Isolating switch to be provided on the door with door interlock.	
2.2.2.2	The contactors shall be triple-pole air break type	
2.2.2.3	All fuses employed for back-up protection shall be of high rupturing capacity (HRC type) and shall be carefully selected in each case in relation to the starting currents and acceleration time of the motors and give short circuit protection to the cable and motor circuit.	
2.2.2.4	Start and stop push buttons to be provided on starter	
2.2.2.5	Running indication and power ON indication lamps to be provided on starter.	
2.2.2.6	Ammeters shall be provided	
2.2.2.7	Separate optional price for all the starters shall be indicated in the price bid.	
3.1	INDICATION LAMP FOR BARRING GEAR / TURNING GEAR ENGAGED	
	Limit switch with changeover contacts at the turning gear engaging mechanism shall be provided for connection to the indicating lamps on the engine room panel to indicate 'Barring Gear Engaged'. Further this indication at the engine manoeuvring stand in engine room shall be by means of water tight indicating lamp unit. Spares shall be included.	
3.2	Necessary system shall be provided for effecting inter- locking between barring gear and main engine starting equipment so that when barring gear is engaged , the engine cannot be started.	
4	MIST DETECTOR (If required as per Class Rules)	
	The plant shall be suitable for operation on 230 V single phase , 50 Hz supply. All the cables / pipes on the engine shall be completed by the main engine makers and shall be as per Part -B- Machinery part.	
5	INSTRUMENTATION: Instrumentation, Alarm and Trips shall be provided for Main Engines based on Manufacturers recommendations and latest classification society requirements.	
	Following instruments shall be supplied for mounting in the engine room and bridge console of shipyard' s supply and at other places for each engine . The quantity of units mentioned are for one engine only. Necessary transmitters shall be fitted on the engine / turbochargers , etc. and the same shall be suitable for 24V DC . The dial illumination lamps shall also be suitable for 24 V DC wherever required for the following items which operate on 24 V DC.	
5.1	Main Engine RPM indicator system . The supply shall include the following :	
5.1.1	One No. Transmitter suitably located on Main engine to operate RPM Indicator.	
5.1.2	For RPM Indicators of Wheel House Console and ECR Console Please refer Para No. 7.4.1 & 7.4.2 below.	
5.2	Main engine Running Hour Indicator system consisting of :	
5.2.1	Potential free change over contact which shall be actuated when the engine is started (e.g. Actuated by fuel admission) to operate main engine running hour indicator.	

Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
5.2.2	1 No. 7 digit 24 V DC operated running hour indicator for main engine suitable for engine guage panel.	
5.2.3	1 No. 7 digit 24 V DC operated running hour indicator for bridge console with built in dial illumination and dimmer control .	
5.3	Main engine over speed alarm system consisting of :	
5.3.1	One (1) No. Engine over speed switch with potential free change over contacts to actuate engine over speed alarm signal and hooter shall be provided.	
5.4	Main engine turbo charger RPM indicators consisting of :	
5.4.1	1 No. Transmitter for each Turbo charger.	
5.4.2	1 No. RPM Indicator for each Turbo charger suitable for engine room BHD / Console mounting.	
5.4.3	1 No. RPM Indicator of 144 X 144 mm size with built in dial illumination and dimmer control suitable for mounting on the bridge console	
6	STOP FUNCTION FOR GOVERNOR	
	Energised to stop type shut down device of the governor shall be suitable for 24 Volts DC which will be made available on board the ship for this purpose. Power requirement of this magnet shall be indicated. For the items mentioned above the scope of supply shall include necessary electronic / electrical component boxes, special cables , etc., wherever applicable.	
7	CONTROL / INSTRUMENT / MONITORING SYSTEM	
7.1	Engine Starting and Local Control Panel: Two Engine starting and local control panels (One for each Engine) shall be provided in the main machinery compartment near the Engine control position. Integration of Engine Control System with SRP Control Shall be included in the scope of supply.	
7.2	Control / Monitoring System: The control / monitoring system shall be as recommended by Engine / Propulsion system manufacturers. The Engine / Propulsion system will be controlled from the Engine Room / ECR and Bridge. The control station in the Bridge and Engine Room will have provision for, stopping, monitoring control and operation of Engine and propulsion system.	
7.3	The Main Engine and SRP units shall be started from engine room and then control shall be transferred from engine room to wheel house and vice versa while stopping the propelling machinery.	
7.4	The following requirements of propulsion control system shall be considered while designing the M.E Controls / Monitoring / Instrumentation. All necessary interface for integration with SRP Control System shall be included.	
7.4.1	ECR Console: One (1) No. Drop in panel for each engine shall be supplied, comprising of the following controls and instruments.	
	i) Engine Speed Gauge	
	ii) Turbo Speed Gauge	
	iii) Exhaust Teperature Gauge	
	iv) Start / Emergency Stop Push Button with flap	
	v) Alarm Hooter	
	vi) Oil Pressure / Temperature Gauge	
	vii) H.T. Water / LT Water Temperature Gauge	

Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
7.4.2	Forward & One for Aft Consoles) shall be supplied, comprising of the following controls and instruments.	
	i) Engine Speed Gauge	
	ii) Start / Emergency Stop Push Button with flap	
7.5	All the Console mounted panels shall be supplied with 2 mts. Cable and Terminal blocks suitable for flush mounting on the console.	
7.6	Necessary E / P converters shall be supplied.	
8	<p>ALARM SENSORS: Sensors for giving Alarm, Indication and Safty Shutdowns required as per class rules shall be provided on the Engines. All the sensors / switches shall be wired to a terminal box.</p> <p>Note: HSL shall provide centralised ships Alarm Plant and all necessary Signal feeds shall be extended. The Main Engine Supplier shall Co-ordinate with Ships Alarm Plant Supplier for Integration of System.</p>	
9	TERMINAL BOX	
	All Electrical units including contacts , transmitters, sensors, bosses, etc. shall be pre-wired to a water tight terminal box on the engine with proper terminal markings and this wiring shall be protected suitably against mechanical damage by protective piping. Necessary W. T. Brass Cable glands shall be provided.	
10	UPS SYSTEM : Necessary UPS system will be provided by HSL for 24V DC consumers of M.E, SRP and Alarm Montoring System. Hence, the 24V DC load requirement for M.E. Control system shall be indicated in the Technical Offer.	
11	SPARES	
	Spares shall be supplied as per the following basis for all the electrical items taking into account the total number of identical parts fitted. All the spares shall be stowed in suitable metallic or wooden cases and each part shall be labelled in English furnishing the part number, etc. Spares shall be supplied separately furnishing the list of spare parts , indicating total quantity .	
	Spares shall be supplied according to the classification Societies requirements . Over and above the Classification Societies requirements , if any other spares and tools are necessary for the proper and efficient maintenance of the equipment as per Maker's recommendations, the same shall be included in the supply.	
11.1	The list of spares included in the scope of supply shall be enclosed to the Technical Offer.	
11.2	The following spare parts shall necessarily be included in scope of supply. Separate Unit Price for the spare parts shall be indicated in the price bid.	
	a) Indicator lamps for MCR and Wheel House control consoles, Engine control panels - 24 Nos. of each type & size.	
	b) Tele Fax steel cable for engine speed control alongwith outer tubes - 2 complete sets.	
	c) RPM Meters - 2 Nos.	
	d) Contractors, Overload realys and timers of various capacity fitted on board - 3 each of type (Make of Relays' - Siemens).	
	e) Miniature circuit breaker of various capacity fitted on board - 3 each of type (Make Siemens).	
	f) Fuse base, HRC fuses and bottle type fuses of various capacity fitted on board - 12 each of type.	

Clause No.	Description of technical specification	Vendors Reply: Complied & cost included in offer mentioned above At [B]
	g) Sensors (Circuit protection device) of various type fitted on board - 2 each of type.	
	h) Pressure gauges & Temperature gauges of various type fitted on Main Engine - 2 each type.	
12	TEST CERTIFICATES	
	Works / Classification Test Certificates shall be supplied as per Part A- General part.	
12.1	Maker' s detailed workshop test certificates for all motors shall also be supplied in triplicate along with type approval certificate of motors.	
12.2	Other Electrical items shall also be tested to Classification Society wherever applicable per Part B- Machinery Part.	
	Manager	Manager
	(Electrical Designs Materials)	(Electrical Designs)