**SHIP BUILDER**

**HINDUSTAN SHIPYARD LIMITED**
**VISAKHAPATNAM- 530005.**

# TENDER TECHNICAL SPECIFICATION FOR

# MAIN PROPULSION PACKAGE

**TENDER TECHNICAL SPECIFICATION FOR DESIGN, INTEGRATION, SUPPLY & COMMISSIONING OF MAIN PROPULSION SYSTEM [ VC 11184 ]**

[A] BIDDING FIRM'S NAME :

[B] BIDDING FIRM'S OFFER NO & DATE :

| SL NO. | SPECIFICATION REQUIREMENT | REMARKS OF VENDOR<br><br>COMPLIED/NOT COMPLIED |
|---|---|---|
| 1. | **SCOPE OF PROPULSION INTEGRATOR AND SYSTEM SUPPLIER (PSS) :**<br><br>The scope of the tender includes Detailed Design, Integration, Supply and Technical assistance to Shipyard (HSL) during Installation and commissioning of complete propulsion system with 'Single point responsibility' on Turnkey basis. All installation works will be the scope of HSL under the supervisory guidance of PSS. The detailed scope is placed at Appendix – A. | |
| 2. | **POWER TRANSMISSION :**<br><br>Propulsion System configuration is CODAD; two identical diesel engines driving a CPP, for attaining a max speed of 21 knots. Cruise speed would be around 14 to 16 knots.<br>Each propulsion Diesel Engine is rated at around 9000 KW (power output).Shaft generators are envisaged to ensure optimum loading of engines. One bow thruster is to be provided according to size and tonnage ship for assistance during low speed maneuvering Overall performance criteria established by PSS, would be finalized in consultation with Shipyard / Ship Owner. Technical specifications of equipment and relevant drawings for Engine room arrangement are detailed at Appendix-B & D respectively. | |
| 3. | All propulsion equipment and their support systems, auxiliary equipment/components, duly interfaced are to be supplied by PSS, on turnkey basis. As regards to spares & tools, PSS to include on-board spares & tools for meeting operational & maintenance requirements (for 02 years), in the scope of supply. The PSS shall also assist Shipyard for procurement of Shipyard scope of supply, as per PSS specifications. List of such scope is | |

| | | |
|---|---|---|
| | to be provided by PSS. | |
| 4. | Enclosures :<br>a) Scope of Propulsion Integrator and System Supplier(PSS) – Appendix A<br>b) Scope of supply of PSS – Appendix B<br>c) General requirements – Appendix C<br>d) Lines Plan - Appendix D<br>e) GA drawing of vessel - Appendix E<br>f) Training programme - Appendix F | |

**APPENDIX – A**

## SCOPE OF WORK FOR PROPULSION INTEGRATOR AND SYSTEM SUPPLIER (PSS)

| SL NO. | SPECIFICATION REQUIREMENT | REMARKS OF VENDOR<br><br>COMPLIED/NOT COMPLIED |
|---|---|---|
| 1 | **SCOPE OF WORK** : The scope of the tender includes design, integration, supply and commissioning of complete propulsion system package for satisfactory performance and to meet the vessels overall requirements. | |
| 2 | **BROAD SCOPE OF SERVICES FOR PSS**:<br>The PSS shall develop the complete propulsion system package, duly ensuring that all propulsion equipment and their support systems auxiliary equipment/components are seamlessly integrated with each other and with the shipboard systems (including Integrated Platform Management System) and hull structure; for achieving envisaged performance objectives. | |
| 3 | The PSS shall ensure that all components of the Propulsion System are seamlessly integrated with each other and with the shipboard systems (including IPMS) and hull structure for achieving envisaged performance objectives. | |
| 4 | Broad scope of services, to be executed by PSS is as follows : | |
| 4.1 | Relevant studies / analysis , during design and integration process | |
| 4.2 | Active interaction with Integrated Platform Management System vendor, for ensuring reliable and safe propulsion system controls and monitoring. | |
| 4.3 | Detailed design drawings (co-ordination level drgs)/ documents for finalization of propulsion system layout / arrangement, associated support system and equipment foundations. Based on the same subsequent production activities would be commenced by Shipyard. | |
| 4.4 | Propulsion equipment FATs analysis; for ensuring compliance to envisaged performance. If considered necessary Ship Owner, has the right to inspect the equipment or witness the FATs, on Ship Owners expenses. For such cases, PSS would provide at least 60 days notice for trials at OEMs premises abroad and 03 week notice for trials at OEMs premises in India | |

| | | |
|---|---|---|
| 4.5 | Technical assistance / supervision during installation / alignment of propulsion system. | |
| 4.6 | Technical assistance / supervision during STW/ HATs/ SATs of propulsion system | |
| 4.7 | Acceptance / Commissioning of propulsion system as per envisaged performance objectives | |
| 4.8 | Documentation : During overall evolution / process, various technical documentation generated by PSS from time to time shall be submitted to HSL for perusal and comments / concurrence as applicable | |
| 4.9 | With respect to equipment installation , trials and exploitation aspects, documents covering following aspects ( but not limited to) is also to be prepared / submitted by PSS to HSL . | |
| 4.9.1 | Class approved Propulsion plants installation & class approved alignment procedure ( Including QAP) | |
| 4.9.2 | Propulsion system trial protocols/documentation (for STW/HATs/SATs) | |
| 4.9.3 | Exploitation & maintenance of propulsion system (for operators & maintainers) | |
| 5 | PSS would apply best and proven engineering practices, for ensuring efficient , reliable, safe and robust propulsion system. During the overall process, all important technical matters would be required to be discussed and mutually agreed upon with Shipyard / Ship Owner; prior to proceeding further activities for implementation. | |
| 6 | PSS should have proven past experience in executing similar scope as per this tender . Relevant details / reference lists of such past experience are to be submitted while responding to this tender. | |
| 7 | PSS shall indicate lumpsum charges for providing technical assistance / supervision at yard. PSS shall forward the major check points where the service engineer is required alongwith the no. of days at each stage. The check list of jobs to be completed by HSL prior to arrival of service engineer for supervision / commissioning is to be submitted within one month of placement of order.<br>Note : 1) In case the check list is completed by HSL and the work is not completed within envisaged period no extra payment would be made by HSL. However, for delay attributable to HSL, extra fixed man day rate is to be submitted alongwith the bid.<br>2) For PSS overall scope including technical services (assistace to Shipyard), PSS shall submit techno-commercial bid with firm & fixed price (along with breakdown of cost as applicable). Man-day rates considered for technical services (Assistance to shipyard) for installation / alignment, trials & | |

| | | |
|---|---|---|
| | acceptance / commissioning activities; PSS shall indicate various hold points/important checks in consultation with shipyard , as per shipyard's ship production schedule. | |

**APPENDIX – B**

## SCOPE OF SUPPLY OF PSS

| SL NO. | SPECIFICATION REQUIREMENT | REMARKS OF VENDOR<br><br>COMPLIED/NOT COMPLIED |
|---|---|---|
| 1 | **MAIN ENGINES WITH ACCESSORIES :TWO NOS**<br>Two nos. medium speed, non reversible, uni directional, turbocharged, inter-cooled, propulsion marine diesel engines each developing requisite power under specified environmental conditions for the vessel shall be installed on the ship to meet specified endurance and speed requirements.<br>The minimum engine usage should be 12000 hrs per engine during one operating cycle. | |
| 1.1 | **PROPOSED SPECIFICATION OF EACH ENGINE.**<br>a) MCR Power : approx 9000 KW<br>b) CSR Power : 21 knots or above at 85% MCR of engine with the ship fully laden in sea state 3 or less<br>c) RPM : Medium Speed<br>d) Type : Non-reversible, unidirectional, turbocharged<br>e) Starting : Pneumatic<br>f) Operability : Unrestricted continuous service<br>g) Exhaust norms : MARPOL Tier-II compliant<br>h) Shock standards : Shock capability of equipment like Main engines, gear box and shafting shall meet class requirements. | |
| 1.2 | **DETAILS OF PROPOSED MODEL**:<br>All technical data sheets related to the model proposed like dimensional drawings, performance curves, system schematics etc shall be forwarded. | |
| 1.3 | Engine shall be supplied with all essential systems like Lube oil, fuel oil, starting air, cooling water, exhaust, control systems etc for achieving envisaged performance objectives. All the components and accessories specifically required for the equipment shall be in the scope of supplier | |
| 1.4 | Detailed schematics of the systems clearly defining the scope of yard shall be provided along with the offer. | |
| 1.5 | Starting air receivers of suitable capacity with accessories for no. of starts as per class for Main engine shall be provided. | |

| | | |
|---|---|---|
| 2. | **FLEXIBLE COUPLINGS**:<br>Flexible couplings required between main engines, gear box and shaft generators and shafting with necessary coupling bolts and nuts shall be provided. Classification certificates shall be provided for couplings, bolts and nuts. | |
| 3. | **GEAR BOX WITH ACCESSORIES:** | |
| 3.1 | PROPOSED SPECIFICATION OF GEAR BOX :<br>One (1) double input, single-out put gearbox and built in thrust bearing shall be installed. Gearbox shall have PTO outlets for 2 nos. shaft generators. | |
| 3.2 | DETAILS OF PROPOSED MODEL:<br>a) Make : To be indicated by PSS<br>b) Model : To be indicated by PSS<br>**c)** Reduction ratio : To be indicated by PSS | |
| 3.3 | For engaging and disengaging the propulsion diesel engines with the Gearbox, suitable clutches (one on each input shaft) would be provided. Gearbox would have provisions like Gearbox mounted Thrust block, Gearbox driven lub oil pumps, Turning motor, Locking device for shaft, Electrical motor driven lub oil pumps, Two PTOs for Shaft Generators and Gearbox mounted oil distribution box (ODB) for CPP hydraulic system. | |
| 3.4 | Gear box must be designed to cater for over torque capabilities up to 120% of maximum torque. | |
| 3.5 | Oil coolers shall be provided according to Class and manufacturers requirement. | . |
| 3.6 | A facility for remote monitoring of bearing temperatures at the IPMS catering for all gearbox bearings shall be provided along with warnings and alarms for temperatures exceeding normal operating limits | |
| 3.7 | Shaft turning gear arrangement with interlock | |
| 3.8 | A locking device of the propeller shaft will be provided on the gearbox with interlock and will be rated for maximum 50% of the nominal torque. | |
| 4. | **PROPELLERS AND TRANSMISSION :**<br><br>Type of Propulsion : CPP | |
| 4.1 | The system shall include: Controllable Pitch propellers, propeller shafts with couplings, bearings, plummer blocks, bulkhead glands, stern tubes with linings and inner and outer seals and shaft brake, all associated hydraulics, controls and instruments. | |

| | | |
|---|---|---|
| 5. | **SHAFT GENERATORS : QTY – 2 NOS.**<br><br>Shaft generators of 1.2 MW capacity each shall operate from PTO outlet of Gear box.<br>Supply Voltage - 415V AC, 3 Ph, 50 Hz, 0.8 Pf, 3 wire with floating neutral<br>Shaft generators will run parallel only during shifting of loads and will not be used for continuous parallel operation with each other and ships main generator. The Shaft Generator shall be compatible with Automatic Power Management System ( APMS ), and IPMS .<br>Generators shall be suitable for unattended parallel operation.<br>The Shaft Generators are to be connected to a common 430 V AC Bus bar and distributed between two switchboards.<br>The make of Shaft generators shall be identical to the alternators of the ship's Main DG sets , to maintain uniformity with the Main DG sets installed onboard. However, the responsibility of integration of Shaft generators with Propulsion equipment lies with PSS. | |
| 6. | **BOW THRUSTERS : ONE NO.**<br>Capacity - 1 MW<br>Main Supply - 415V AC, 3 Ph, 50 Hz, 3 wire with floating neutral<br>All accessories for hydraulic system like power packs, pumps, on-built pipes and fittings etc shall be included.<br><br>Control system : A Local Control Panel with suitable Marine type enclosure and starter shall be provided and compatible with Automatic Power Management System ( APMS ) and IPMS. Flush console mounted type control panels shall be provided for Bridge and bridge wings (Port and Starboard) with 2 mtrs cable and terminated in a terminal block . | |
| 7. | **ASSOCIATED SYSTEMS TO PSS:** | |
| 7.1 | All systems integral to the equipments being supplied by the PSS like Fuel oil, Lube oil, Starting Air, Control air, cooling water, Hydraulic oil system, etc would be in the scope of PSS. Any inclusions / exclusions should be clearly indicated. P&IDs of all systems shall be approved by class and submitted with offer. | |
| 7.2 | Exhaust system : Diesel engine exhaust uptakes are accommodated into two separate funnels, each on port and starboard side. The funnels have been positioned such that exhaust plume is directed towards ship side. PSS shall assist | |

| | | |
|---|---|---|
| | in back pressure calculations upon submission of the exhaust layout by HSL. The scope of PSS for exhaust system shall be upto and including the bellow after Silencer. | |
| 8 | **ACCESSORIES :** | |
| 8.1 | Torsional vibration damper, turning gear /mechanical cranking device, interlocking device, shock and vibration mounts etc as recommended by PSS | |
| 8.2 | All pipes on engine shall be provided with counter flanges complete with bolts, nuts and gaskets for connecting onboard piping system. Unions shall be provided, for screwed connections, if any. Protective conduit for electric cables on engine shall be provided. | |
| 8.3 | Instrumentation, Alarms and trips shall be provided for PSS based on manufacturer's recommendation and meeting classification society requirements. | |
| 9 | **Electrical Requirements** | |
| 9.1 | Power Supplies available onboard the vessel<br>- 415V, 50Hz, 3 Phase, 3 wire with floating neutral<br>- 230V, 50Hz, 3 Phase and 1 Phase | |
| 9.2 | In case of any power supply requirement other than the above; suitable conversion unit operating on above power supplies shall be included in the scope of supply. | |
| 9.3 | **UPS SYSTEM :**<br>Necessary UPS system shall be provided for 24V DC ( ripple factor as required within limits ) consumers of M.E, Propulsion System, Gear Box etc., complying to class requirements. The input supply to the UPS shall be 415V AC, 50 Hz, 3 Ph. 24V DC load requirement for the M.E, Propulsion System, Gear Box etc., Control system shall be indicated in the Technical Offer. The batteries shall be supplied by HSL and the Ah capacity of the batteries shall be indicated in the Technical Offer. | |
| 9.4 | Power ( KW) requirement and no. of feeders required for each system shall be indicated in the offer. | |
| 9.5 | **a) Cables:**<br>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 cables of following specifications shall be used.<br>EBXL cables to be used as per EED-50-12 or relevant applicable standard.<br><br>**b) Cable Glands:**<br>Suitable W.T cable entry glands shall be provided for all the starters, control panels and Motors. | |

| | | |
|---|---|---|
| 9.6 | All Electric Panels and DBs shall be provided with electrical 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 or DBs. | |
| 9.7 | IP rating for Associated Electrical Equipment (Motors & Panels)<br>The IP rating of the motors and panels shall meet the Class requirement as per the place of usage. | |
| 9.8 | **Motors:**<br>Direct online motor starters should be provided for all services below 5HP Star Delta starters should be provided for motors of 5 HP rating and above incorporating over current, short circuit and single phase protection. The motor will be selected conforming to EED – Q – 071 Enclosures of the motors will be as per IP – 57 in the weather / exposed desk areas. In the machinery spaces, motors will be selected. The motors manufacturers in turn will procure the starter through IHQ MoD ( N ) approved vendor and will integrate the motor, starter, as well as freeze its settings. The motor manufacturer is to ensure completion of starter motor integrated trials and implementation of all required protection will be the responsibility of the motor manufacturer. | |
| 9.9 | **STARTERS AND CONTROLLERS :**<br>All the starters and controllers provided will be of totally enclosed marine type as per EED – Q – 071 ( R3 ) / Def Stan 01 – 636. They will have in addition, protection as per class rules and push buttons for start / stop with indicator lamps for running / failure. The control panel for various auxiliaries will incorporating necessary contractors / control devices for efficient and sequential control of motors. Motors below 5KW will be provided with DOL starter. Motors between 5 and 15 KW will be provided with Star Delta starter having protection of over current, single phasing failure, earth fault, terminal ( thermister ) protection and under voltage. The starters should be procured through IHQ MOD[N] approved vendors.<br>Soft starters to be provided for motors as applicable | |
| 9.10 | **Instrumentation :**<br>All Instrumentation shall be easily accessible for reading, maintenance and replacement. Instruments used for operation and monitoring of the main propulsion machinery are to be mounted near to equipment for the convenience of the operator. Thermometers / temperature gauges are to be located to assure ease of temperature observation to obviate accidental breakage. Pressure gauges are to be installed as | |

| | | |
|---|---|---|
| | required for the safe operation and control of systems, machinery and equipment and facilitate easy readability from a distance. All gauges are to be grouped on common boards / panels based on machinery being monitored or parameters being indicated. | |
| 9.11 | The engine controls and alarms will be as per OEMs recommendations and in accordance with the class requirements. The control of each engine will be accomplished by means of electronic governor. | |
| 9.12 | Propulsion System Suppliers shall coordinate with Integrated Platform Management System ( IPMS ) Supplier for Interface drawings and for Integration of these systems for satisfactory functioning. | |
| 9.12.1 | **Control and Monitoring of Main Engine.**<br>Remote control and monitoring are to be carried out by integration with the Integrated Platform Management System (IPMS) through serial links and hardwired input / output for necessary critical parameters. The local control and monitoring of the main engine will be carried out through an Electronic Local Control Panel (LCP) supplied by the engine OEM.<br>The main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system. | |
| 9.12.2 | An Integrated Platform Management System ( IPMS ), will be provided by HSL, capable of controlling and monitoring main propulsion system remotely. The propulsion control consoles for Bridge and MCR will be supplied HSL ( through IPMS Supplier ). | |

**APPENDIX – C**

## GENERAL REQUIREMENTS

| SL NO. | SPECIFICATION REQUIREMENT | | | REMARKS OF VENDOR<br><br>COMPLIED/NOT COMPLIED |
|---|---|---|---|---|
| 1. | **MAIN PARTICULARS OF THE VESSEL** | | | |
| 1.1 | Description | | Parameters | |
| 1.2 | Length Overall | | 175.77 M | |
| 1.3 | Length between perpendiculars | | 161.0 M | |
| 1.4 | Design draft (moulded) | | 6.45 M | |
| 1.5 | Breadth moulded | | 22.70 M | |
| 1.6 | Design Displacement | | Approx.14700 Tonnes | |
| 1.7 | Max.Sustained Speed @85% MCR | | min 21 Knots with ship fully laden in sea state 3 or less | |
| 1.8 | Cruising speed | | 14 knots | |
| 1.9 | Loiter speed | | 04-05 knots ( for 45 minutes) | |
| 1.10 | Endurance | | 14000 miles at 14 knots<br>7000 miles at 21 knots | |
| 1.11 | Total no. of persons onboard | | 300 persons | |
| 2. | **Ambient Conditions** : | | | |
| 2.1 | Sea water temp | | 1 deg.C to + 35 deg.C | |
| 2.2 | Max relative humidity | | 100% at 38 deg C | |
| 2.3 | Salinity of water | | upto 35 ppt | |
| 2.4 | Machinery room temp | | Machinery compartments shall be maintained at Ambient + 5 Deg C in open condition and between 45 to 50 $^{0}$C in closed condition | |
| 3 | **Operating regime** : | | | |
| | Sl no | Speed range | Percentage operation for main propulsion | |
| 3.1 | A | 0 – 8 | 05 | |
| 3.2 | B | 9-13 | 05 | |
| 3.3 | C | 14-20 | 80 | |
| 3.4 | D | >20 | 10 | |
| 4. | **RULES AND REGULATIONS :** All the equipment included in the scope of supply shall be certified by dual class , DNV | | | |

| | | |
|---|---|---|
| | and IRS.<br>The vessel shall be built under IRS and DNV class. The class notation should cater for helideck, special government service.<br><br>IRS :+ SUL + IY, Helideck, Special government service<br><br>DNV:✠ 1A1 Helideck, R0, Naval support (Hull), Navdist | |
| 4.1 | **EQUIPMENT TO BE SUPPLIED AS PER CLASS/IMO/MARPOL REQUIREMENTS** | |
| 4.2 | **TESTING :** All equipment shall be tested in presence of Class in manufacturer's workshop and test certificate shall be produced. The owners / HSL reserves the right to depute representatives to witness Factory Acceptance Trials (FATs) of equipment. All expenses towards lodging, boarding, conveyance and any other incidental expenses will be borne by the Ship Owner. PSS shall provide at least 60 days' notice for any trials abroad and three weeks' notice for trials in India. | |
| 4.3 | Vendor has to directly contact classification / statutory authorities as required for approval of drawings, testing, inspection, certification, etc. All classification charges at Factory shall be borne by PSS and included in offer. | |
| 5. | **DOCUMENTS TO BE SUBMITTED WITHIN 3 MONTHS AFTER PLACEMENT OF ORDER** | |
| 5.1 | List of Drawings / documents to be submitted after order : | |
| 5.1.1 | Shafting arrangement drawings | |
| 5.1.2 | Shaft Alignment drawings | |
| 5.1.3 | Detailed drawings of Machinery of PSS scope | |
| 5.1.4 | Foundation/mountings details of machinery of PSS scope | |
| 5.1.5 | Bow thruster, tunnel arrangement drawings | |
| 5.1.6 | Schematic drawings of all systems of PSS. | |
| 5.2 | Torsional Vibration Calculations (TVC) , IPI and all relevant class approved drawings and documents. | |
| 5.3 | Installation drawing indicating Foundation details and procedure and space constraints for withdrawal of various accessories of all the offered machinery and equipment shall be furnished. | |
| 5.4 | Project guides for installation & work execution of the equipment offered in 2 sets. | |
| 5.5 | List of Lubricants (Brand & Grade) recommended for the equipment offered shall be indicated in the offer. Equivalent | |

| | | |
|---|---|---|
| | lubricants available with indigenous Oil companies shall also be indicated in the above list. | |
| 5.6 | Heat Balance diagram showing heat dissipation, cooling water requirements of various accessories are to be included in IPI. | |
| 5.7 | Final Drawings in IPI shall be supplied in three (3) sets in hard copies and in soft DWG format in one (1) C.D. in AUTOCAD 2004 | |
| 5.8 | PSS shall submit the under mentioned certificates and reports in triplicate ( 1 Original + 2 copies) after shop trial :<br>a) Shop test data duly signed by class & owners.<br>b) Classification Type approval,<br>c) Manufacturer Test Certificate . | |
| 5.9 | Six sets of instruction, operation, maintenance, parts list and spare parts manual | |
| 7 | **SPARES :** | |
| 7.1 | **ONBOARD SPARES :** PSS recommended on-board spares for two years exploitation shall be provided for each equipment in ILMS format indicating the item code number, quantity and itemwise cost. | |
| 7.2 | **BASE & DEPOT SPARES:**<br>PSS shall forward separate offer for supply of base and depot spares for five years exploitation within one month of placement of order for all equipment. The quotation will be for unit price of each item offered. One copy of parts identification list, wherever made available by the supplier will be supplied with quotation. The validity of offer from the supplier will be requested for 18 months. Owner will subsequently range and scale the B & D spares and shipyard to procure the B & D spares.<br>A separate order shall be placed for B&D spares and it is not a part of this order. | |
| 8 | **TOOLS :** Regular maintenance and special tools if any required for each equipment shall be provided by PSS**.** Separate lists shall be forwarded for each equipment / machinery being supplied. | |
| 9 | **Product Support** : An assurance is to be confirmed regarding availability of product support to Owners for at least 20 years. | |
| 10. | **Onboard Training of Crew**:<br>PSS shall arrange training of complete crew of the SHIP by the Original Equipment Manufacturer's reps onboard on the above items<br>Training should be as per DPP-2011 Chapter V Art 37 Appendix B to Annexure IX (Standard Contract Document), | |

| | | |
|---|---|---|
| | (placed as an Appendix F to this specification**)**<br>Note : Separate cost shall be indicated in the offer for Onboard training. | |
| 11. | Systems and features not included in the specification, which vendor deem necessary for satisfactory operation of the supplied system, same shall be supplied free of cost even if observed during installation/ commissioning. | |
| 12. | The final selection of the PSS shall be based on the TNC (Technical Negotiation Committee) held between representatives of Owners, HSL and PSS. | |
| 13. | **Weight criteria** : The approximate weight of scope of PSS excluding bow thrusters is estimated to be 542.0 Tonnes. The dry and wet weight of all items supplied shall be furnished along with the offer. | |
| 14 | **DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:** | |
| 14.1 | Technical leaflets, catalogues& reference lists of installation for quoted equipment | |
| 14.2 | Performance curves between Power and Speed showing propeller curves, fuel ratings, engine torque etc. | |
| 14.3 | G.A drawing showing foundation and dimensional details with weight for each equipment with accessories. Preliminary Shafting arrangement for the propulsion system. | |
| 14.4 | List of Alarm Monitoring Points, controls and instrumentation system details as per class requirements shall be supplied | |
| 14.5 | Schematic drawing for Piping and Instrumentation diagrams indicating size of the connection pipes, pipe fittings, valves etc., for all systems like F.O, L.O, Hydraulic, cooling water ,Starting Air, control air, Exhaust Gas System etc. | |
| 14.6 | Electrical schematics and cable diagrams of each system and arrangement as offered | |
| 14.7 | List of all exclusions and inclusions considered in the scope of supply and service. | |
| 14.8 | Onboard training programme for ship crew to be forwarded with offer. | |

# APPENDIX – D & E

Appendix D (Lines Plan) and Appendix E (GA Drawings of Vessel) will be sent upon specific request from the interested firm to rfpurchase.hsl@gov.in

Appendix F

# TRAINING

1. Operator Course. This course is designed to give the student the necessary knowledge to operate an Equipment ___ effectively. It also covers unit maintenance procedures and procedures for unit level repair and replacement of parts.

| Time | Course | Description | Materials |
|---|---|---|---|
| -- hrs | | This course covers the theory, operation and proper sampling techniques. It will include hands on and visual presentations. | Slide Show, User Guide |
| --hrs | | This course allows the student to do practical exercises with an Equipment ___. | User Guide, Equipment ___ unit, Practical outline |
| -- hr | | This time allows the student to ask any questions they have and review for the test. | User Guide, Equipment ___ unit |
| -- hr | Operator Test | The student takes the certification test. | User Guide, Test paper |

2. Trainer Course. This course is designed to give the student an understanding of the Equipment ___ as well as first line maintenance techniques that will the student to keep the (Equipment) ___ working properly. In addition to that there will be a course on training others how to use the (Equipment) ___ by stressing the important issues using the (Equipment) ___. Following the course there will be a certification test which will then allow the student to train other users on the (Equipment) ___.

| Time | Course | Description | Materials |
|---|---|---|---|
| --hrs | | This course covers the theory, operation and proper sampling techniques. It will include hands on and visual presentations. It will also include first line maintenance techniques used in the field. | Slide Show, Supervisor Guide |
| -- hrs | | This course allows the student to do practical exercises with an (Equipment) ___. | Supervisor Guide, (Equipment) ___ unit, Practical outline |
| -- hrs | | This course cover the important issues in training other users on the (Equipment) | Trainer Guide, (Equipment) unit |
| -- hrs | | This course allows the students to practice training other users on the (Equipment) ___ under supervision. | Trainer Guide, Slide Show, (Equipment) unit |
| -- hr | Supervisor Test | The s tudent takes the certification test. | SupervisorGuide, Test paper Trainer Guide |

3. Field Repair level Maintenance Training. This course is designed to give the student an understanding of the (Equipment) as well as first line maintenance techniques that will the student to keep the (Equipment) working properly. Then the course will discuss the Mechanical/Automotive/Electronic/Armament portion of the (Equipment). A break down of all components as well as the calibration procedure is taught. The student will then take apart and rebuild an (Equipment) ___ going over various points. Following the classes there will be a certification test which will allow the student to then do any repairs needed on the (Equipment).

| Time | Course | Description | Materials |
|---|---|---|---|
| -- hrs | - | This course covers the theory, operation and proper sampling techniques. It will include hands on and visual presentations. It will also include first line maintenance techniques used in the field. | Slide Show, Supervisor Guide |
| -- hrs | | This course allows the student to do practical exercises with an (Equipment) ___ | Supervisor Guide, (Equipment) ___ unit, Practical outline |
| - hrs | | This course covers all the electronics in the (Equipment) ___ A look at all the PCBs in the unit and the procedure of analyzing samples. | Technical Guide, (Equipment) ___ unit |
| - hrs | | This course discusses the troubleshooting | Technical Guide, |
| -- hrs | | techniques used for repairing an (Equipment) ___. This course cover the proper procedure in calibrating and (Equipment) ___. | (Equipment) ___ unit Technical Guide, (Equipment) ___ unit |

4. Component level Maintenance Training. This course is designed to train students to undertake component level repair of all assemblies, subassemblies, modules, PCBs ect.

5. Base Repair Maintenance Training. The syllabus for base repair maintenance training will be finalised during MET as per the requirement of the BUYER.

6. Technical Know How. The SELLER shall provide the complete know how on the technology used, repair and maintenance of the equipment and shall not withhold such information during the conduct of the training. Maintenance philosophy will be discussed and suggested norms for major maintenance tasks will be provided by the SELLER.