



"In pursuit of Excellence and Quality in Shipbuilding"

Garden Reach Shipbuilders & Engineers Limited

DIESEL ENGINE PLANT

(A Govt. of India Undertaking, Ministry of Defence)

An ISO 9001-2015 Plant

Plant Plaza Road, Dhurwa, Ranchi - 834 004

Phone: 2446134/2401428/2446360/2401548, Fax: + (91) 0651-2446895

निविदा आमंत्रण / INVITATION TO TENDER

Tender No. DEP/LT/ST/P17A/P20-22/EXHAUST SYSTEM/ET-1904.

DTD. 08.10.2022

For Supply of Item: DESIGN, MANUFACTURING, SUPPLY AND ERECTION/INSTALLATION & COMMISSIONING OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE ALONGWITH ACCESSORIES FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651,12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)

Tender Submission start Date and Time: 08.10.2022.

Tender Submission End Date and Time: 14.10.2022 at 12:00 Hrs.

Tender Opening Date and Time: 15.10.2022 at 14:00 Hrs.

Dear Sir,

1. Bids in single stage two bid system (Part-I: Techno-Commercial Bid and Part-II: Price Bid) are invited for supply of **"DESIGN, MANUFACTURING, SUPPLY AND ERECTION/INSTALLATION & COMMISSIONING OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651, 12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)"** as per Scope of Technical requirement (SOTR) enclosed at **Annexure-II** through e-tendering mode:

(a) Part - I: Techno-Commercial bid (it must contain only technical & commercial points and should not contain any price. If any price is indicated in Part-I, the offer will be treated as CANCELLED): ANNEXURE – A & B and ANNEXURE – I (Excel format of Compliance matrix for Instruction to bidders), ANNEXURE-II (Excel format of Compliance matrix for SOTR).

(b) Part - II: Price bid (containing only price): ANNEXURE – C.

2. You will have to submit bid in two part (Techno-Commercial & price Bid) in e- procurement mode (<https://eprocuregrse.co.in>) where all data sheet will be available for download, need to fill up the required field and upload the file. Price bid need to be filled up in a given price bid data sheet only (ANNEXURE-C). No other attachment regarding price will be allowed if so then offer will be treated as cancelled. You should mention your offer ref. no. and date in ANNEXURE – A, B & C.

3. Tender/Bid formats are to be downloaded from our e-portal tender from GRSE web site. Offers in filled-in formats are to be uploaded using Digital Signature Certificate (DSC) Class - III. Tender opening can be witnessed in team viewer of the Web-portal. For further details/help E-PROCUREMENT cell of GRSE LTD., Kolkata may be contacted at the following numbers:

Tele : 033-24893902 (Direct)

EPBX : 033-24698100-14 Ext. – 315 / mobile 8420008832

4. The job is to supply of **"DESIGN, MANUFACTURING, SUPPLY AND ERECTION/INSTALLATION & COMMISSIONING OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651, 12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)"** as per the Scope of Technical requirement (SOTR) enclosed with NIT as Annexure – II.



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5. Micro & Small Enterprise:

- (a) Issue of Tender sets free of cost.
- (b) Payment of Earnest money will be exempted.
Above benefits will also be accorded to the vendors registered with NSIC under a single point vendor registration scheme. The vendors registered with NSIC under single point will be additionally exempted from submitting the security deposit.
- (c) Vendors registered with MSE (Micro & Small Enterprises) are eligible for the following benefits in accordance with the Public Procurement Policy for Micro & Small Enterprises dated 23rd March 2012.
 - i. MSEs quoting prices within 15% of lowest eligible price bid of other non-MSE bidder(s), shall be eligible for purchase preference for 20% of the order quantity (subject to order quantity being adequate for this purpose) provided the MSE matches the L-1 landed cost at GRSE.
To avail this purchase preference, submission of EM-II/NSIC/UAM certificate is mandatory failing which the benefit will not be accorded.
 - ii. In case of multiple bidders falling under the above category, purchase preference to be accorded in equal proportion within a limit of quantity allocated for this purpose as above.
 - iii. In case any of such MSE is owned by SC/ST category entrepreneur, then that organization will be entitled for 4% out of 20% reserved for this purpose and of equal proportion of the balance 16%.
- (d) Following confirmation is requested from vendors registered with MSE and documentary evidence must be submitted as deemed appropriate:
 - i. Whether MSE registered? If "YES" then you have to submit scanned copy of valid registration certificate & EMII certificate failing which benefits cannot be extended to the firm.
 - ii. Whether MSE registered firm is owned by Entrepreneur belong to SC/ST category? If "YES" then documentary evidence to be submitted, failing which, benefits as detailed in 3biii cannot be extended to the firm.

6. Last date of submission of Bid / Date of opening of bid is indicated in Tender Document. Tender is liable to be rejected if the requisite documents are not enclosed with the technical offer.

7. Date of opening of offer (Price Bid) will be notified in due course after conclusion of TNC/CNC meetings and acceptance of Techno-Commercial offer. Price bids of the qualified vendors could be viewed by the bidders from their own portal.

8. GRSE reserves the right to accept / reject any Tender in full or in part without assigning any reason.

9. Acceptance Format Matrix should be filled up and attached with techno-commercial bid as marks of acceptance of NIT/SOTR/STAC. In case of non-receipt of filled up acceptance format matrix, it would be presumed that you have accepted all our terms & conditions as per GRSE tender until & unless deviation is specifically mentioned in offer.



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10. Queries, if any, or other terms can be clarified from the below mentioned personnel prior to submission of offer:

Sudarshan Tigga, Mgr.(P & S),
G.R.S & E. Ltd., Diesel Engine Plant,
Plant Plaza Road, Dhurwa,
Ranchi – 834 004 (Jharkhand)
Mobile: +91 9264455061
E-mail: tigga.sudarshan@grse.co.in

11. GRSE at its discretion may engage multiple vendors to maintain the delivery schedule.

12. **e-Bid instruction:**

- (a) To participate in the e–Bid submission for GRSE, it is mandatory for the bidders to get their firms registered with E–Procurement portal <http://eprocuregrse.co.in>.
- (b) It is mandatory for all bidders to have class – III Digital Signature Certificate (DSC) in the name of the person who will digitally sign the bid from any of licensed Certifying Agency (CA). Bidders can see the list of licensed CAs from the link <http://www.cca.gov.in>.
- (c) Bidders can view / download Part-1 (Techno-Commercial) bid documents along with all attachments. They need to fill up the downloaded documents as per instruction and upload the same during bid submission. Non-acceptance of any techno-commercial criteria is discouraged. However, if there is any, it is to be commented accordingly and also stated in the separate deviation format.
- (d) Bidders need to fill up Part II (Price) bid online in Excel Template price bid format by inserting unit price only. No other attachment to the price bid will be reckoned
- (e) In case the bidder does not quote his rate for any item(s), it will be presumed that the bidder has included the cost of that/those item(s) in the rates of other items and the rate for such item(s) shall be considered as **Zero** and the tender will be evaluated by the Employer accordingly and the work executed by the successful bidder accordingly.
- (f) Bids can be submitted only during validity of registration of bidder with GRSE e–Procurement portal.
- (g) The amendments / clarifications to the bid document, if any, will be posted on E–Procurement portal / GRSE web site only.
- (h) It will be the bidder’s responsibility to check the status of their Bid on-line regularly after the opening of bid till award of purchase order/work.



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13. **Environment Management and Occupational Health & Safety:**

The vendor shall ensure compliance of Environment Management System (ISO14001:2004), Occupational Health & Safety (OHSAS 18001:2007) & Energy Management System (ISO 50001:2011) while carrying out their activity in the yard.

14. **Quantity of equipment:** Equipments are required as per following quantity for total seven (07) shipsets:

Item	Description	UoM	Quantity
10	EXHAUST SYSTEM	EA	28
20	IRSS DEVICE WITH PUMP ASSEMBLY	EA	28
30	EXHAUST Y-PIECE	NOS	20
40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	SET	7
50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	SET	7
60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	AU	7
70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	AU	7

15. **Delivery schedule:** Equipments are required in a staggered delivery as per following details:

- First shipset of equipment to be delivered to respective shipyard within four (04) months after approval of binding drawing and QAP and remaining shipsets to be delivered within four (04) months each shipset.
- Delivery Schedule for items of clause 14 are as below:

Yard no	Shipyard	Description	Delivery date
12651	MDL	Main equipment	31.01.2023
12651	MDL	Installation and training	31.03.2023
12652	MDL	Main equipment	30.09.2023
12652	MDL	Installation and training	30.11.2023
12653	MDL	Main equipment	31.01.2024
12653	MDL	Installation and training	31.03.2024
12654	MDL	Main equipment	30.09.2024
12654	MDL	Installation and training	30.11.2024
3022	GRSE	Main equipment	31.05.2023
3022	GRSE	Installation and training	31.07.2023
3023	GRSE	Main equipment	31.05.2024
3023	GRSE	Installation and training	31.07.2024
3024	GRSE	Main equipment	31.01.2025
3024	GRSE	Installation and training	31.03.2025

For Garden Reach Shipbuilders & Engineers Ltd./DEP/Ranchi-4.

Sudarshan Tigga

[SUDARSHAN TIGGA]
Manager (P&S)



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Enclosures:

- | | | | |
|----|----------------|---|---|
| 1] | Annexure – I | : | Instructions to Bidders. |
| 2] | Annexure – II | : | Statement of Technical Requirement (SOTR). |
| 3] | Annexure – III | : | Guidelines of Bank Guarantee & Bank Guarantee Formats |
| 4] | Annexure – IV | : | Format for Integrity Pact |



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ANNEXURE – I

INSTRUCTIONS TO BIDDERS

ITEM	:	DESIGN, MANUFACTURING, SUPPLY AND ERECTION/ INSTALLATION & COMMISSIONING OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE ALONGWITH ACCESSORIES FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard No. 12651, 12652, 12653, 12654 & GRSE Yard No. 3022, 3023, 3024)
TENDER FEE	:	NIL
EMD	:	NIL

1. Scope of Supply: Will be as per SOTR (ANNEXURE-II). The requirement is for (MDL Yard No. 12651, 12652, 12653, 12654 & GRSE Yard No. 3022, 3023, 3024) i.e., for 7 ship sets. Service Engineer & Training is to be provided at MDL, Mumbai for Yard No. 12651, 12652, 12653, 12654 & at GRSE, Kolkata for yard No. 3022, 3023, 3024.

2. Integrity Pact: is required to be submitted (As per Format at ANNEXURE-IV) such that the ink-signed copy reaches GRSE before scheduled tender opening. Non-submission of Integrity pact in GRSE format shall lead to REJECTION of offer.

3. EMD & Tender Fee: Earnest Money Deposit is NIL. Tender Fee is NOT APPLICABLE for this tender.

4. INDEPENDENT EXTERNAL MONITORS (IEM): The following Independent External Monitors (IEMs) will have the power to access the entire project document and examine any complaints received by him. In case of any change in IEMs it will be informed accordingly.

(a) The contact details of IEMs for GRSE:

(i) Shri P Sridhar, IRS(Retd.),

Email id: sridharpidatala@gmail.com

(ii) Shri B B Singh, Ex-CMD, MSTC

Email id: bbsinghbeml@gmail.com

5. Security Deposit (SD):

(a) Security Deposit amounting to 3% of PO value in the form of Bank Guarantee (BG) as per GRSE format or Demand Draft in favor of Garden Reach Shipbuilders & Engineers is to be submitted by successful bidder within 4 weeks of receipt of PO/LOA. Security Deposit shall be released only after issue of commissioning report / ICGRN of supplied equipment / materials. SSI units registered under single point registration with NSIC will be exempted from the Security deposit subject to the monitory limit to which they are registered.

(b) SD submitted in the form of BG have to be submitted by supplier/contractor through their issuing Bank in sealed envelope directly to the Office of Additional General



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Manager (I/C-DEP), Garden Reach Shipbuilders & Engineers Ltd, Diesel Engine Plant, Plant Plaza Road, Dhurwa, Ranchi-834004.

- (c) SD in the form of BG would not be accepted directly from the supplier / contractor and if BG not received directly through issuing bank then the BG shall be accepted only after receiving a written confirmation directly from the issuing bank in bank's letter head.
- (d) The SDBG to be submitted on Rs. 500 Non-Judicial Stamp Paper.
- (e) GRSE reserves the right to invoke the SD at any time during its validity period in the event of any breach of terms stipulated in the order.
- (f) SD amount would be released on successful completion of job in all respect duly certified by GRSE. Vendor is to apply for release of their SD which has to be certified by GRSE authorized person. In the event of failure to execute the order satisfactorily or default by the vendor, the security deposit will be forfeited.

6. PERFORMANCE BANK GUARANTEE (PBG):

- (a) The bidder has to submit Equipment Performance Bank Guarantee from a first class Bank of international / national repute, for 3% of total order value excluding taxes, duties freight & service component valid up to contractual warranty period plus one-month claim period.
- (b) In the event of defects due to poor workmanship leading to non-performance of the Equipment/Item and bidder failure to attend the defects within a reasonable period of time, the Bank guarantee will be encashed by GRSE DEP. GRSE DEP's decision in this regard shall be final and binding on the bidder. In the event of postponing of delivery of deliverables or extension of guarantee desired & sought by GRSE DEP, the Performance Bank guarantee has to be extended till the extended period.
- (c) The PBG to be submitted on Rs. 500 Non-Judicial Stamp Paper.
- (d) All the bank guarantees of this tender should be from Nationalized/Scheduled Banks excluding the Co Operative banks. Submission of BG from any other Bank will not be accepted.
- (e) Supplier / contractor have to forward the BG through their issuing Bank in sealed envelope directly to the Office of Additional General Manager (I/C-DEP), Garden Reach Shipbuilders & Engineers Ltd, Diesel Engine Plant, Plant Plaza Road, Dhurwa, Ranchi-834004.
- (f) PBG would not be accepted directly from the supplier / contractor and if PBG not received directly through issuing bank then the PBG shall be accepted only after receiving a written confirmation directly from the issuing bank in bank's letter head.
- (g) GRSE DEP reserves the right to invoke the PBG at any time during its validity period in the event of any breach of terms stipulated in the order.



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7. OPTION CLAUSE: GRSE retains the right to place orders for additional quantities up to a maximum of 50% of the originally contracted quantity at the same rate and terms of the contract. Such an option shall be available during the original period of contract. Option quantity during extended delivery period is limited to 50% of balance quantity after original delivery period.

8. Terms of Price: F.O.R, on door delivery basis (Firm & Fixed till execution of the order), inclusive of packing & forwarding, Transit Insurance & freight charges. No price escalation is allowed at any stage.

9. Delivery Schedule of Main equipment and service: as mentioned above in page no 4 of NIT.

10. Payment Terms:

For supply portion:

A] For MSME:

i) 90% of the value of Purchase order including 100% Taxes & Duties, through ECS/NEFT, within 30 days on receipt of material at GRSE/DEP stores. Following documents are to be submitted along with your bill for payment:

- a) Invoice 4 copies
- b) GRSE stores Receipted challan 4 copies
- c) Packing list 4 copies
- d) Inspection certificates 4 copies
- e) Makers' Test Certificate & Guarantee certificates 4 copies

ii) Balance 10% shall be released after inspection and creation of satisfactory inspection report / ICGRN and against submission of Performance Bank Guarantee for 3% of the order value and valid till expiry of guarantee period. In case of non-submission of PBG of 3% of order value then balance 10% will be retained till the guarantee period. Balance payment shall be released on submission of following documents:

- a) Invoice 4 copies
- b) Copy of clear ICGRN

B] For Others:

i) 90% payment including 100% Taxes & Duties will be made against delivery of the material at GRSE/DEP within 45 days through E.C.S. Following documents are to be submitted along with your bill for payment:

- a) Invoice 4 copies
- b) GRSE stores Receipted challan 4 copies
- c) Packing list 4 copies
- d) Inspection certificates 4 copies
- e) Makers' Test Certificate & Guarantee certificates 4 copies



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ii) Balance 10% will be made against receipt and acceptance of material within 45 days after Guarantee Period or against submission of PBG for 3% of the order value and valid till Guarantee Period. In case of non-submission of PBG of 3% of order value then balance 10% will be retained till the guarantee period. Balance payment shall be released on submission of following documents:

- a) Invoice 4 copies
- b) Copy of clear ICGRN

C] For Service/ Training Portion:

i) 100% payment will be made within 30 days from the date of submission of Invoice submitted along with work completion certificate duly Signed by DEP, GRSE, Ranchi. The Payment for service rendered shall be made on completion of milestones as below.

D] For Service Engineer:

- a) Installation : 15%
- b) STW : 25%
- c) HAT : 30%
- d) SAT : 30%

For Training : 100%

E] Advance Payment: No advance payment will be made.

11. Taxes: GST will be paid extra as applicable. Firm is requested to indicate the presently applicable GST on the Subject item along with the HSN & SAC Code No as applicable.

12. Customs Duty:

12.1. Custom Duty Exemption Certificate, as per customs notification no.39/96 custom, is not applicable with effect from 01.04.2016 as per custom notification nos.29/15 & 14/16 custom.

12.2. Eligible bidders may avail custom duty exemption against Customs notification no 12/12 & 21/12 which are presently in vogue provided the notification 32/16 is complied.

12.3. A declaration in context to complying customs notification no.32/16 is to be submitted along with Registration Certificate under the Customs Rules 1996 (Import of Goods at concessional rate of duty for manufacture of excisable goods) for Central Excise department is to be provided.

12.4. Percentage of Custom duty, if applicable is to be indicated separately.

12.5. Landed Cost at GRSE store for evaluation will be inclusive of all taxes & duties and exemption, if any, for determining L-1 vendor.



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12.6 Vendors to comply extant Government rules as declared by Govt. of India from time to time.

13. Submission of Bills by supplier: The firm shall submit bills complete in all respect as relevant in the check list enclosed. In case bills are submitted with faulty/incomplete enclosure or inappropriate documents:

- i) A transaction fee of Rs.500/- will be charged on first return.
- ii) And the said fees will be twice the amount on second return.

Note: All Bills with relevant documents to be submitted directly to GRSE DEP finance Deptt.

14. Guarantee / Warranty: The equipment along with associated auxiliaries/components shall be warranted by the equipment supplier for the stipulated performance for a period of forty eight (48) months from the date of delivery of equipment to GRSE and MDL.

(a) The Equipments supplied shall be warranted against damage or failure or malfunction or under performance due to defects in design, material and/or poor workmanship or inappropriate material and non-conformance to specifications during the said period. Should such damage or failure or malfunction or under performance occur within that period, the supplier shall replace or repair such defective parts so as to achieve the stipulated performance. All expenses on account of such repair/replacement of parts against warranty defects shall be borne by the supplier.

(b) 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.

15. Inspection / Test Certification: As mentioned in the SOTR receipt inspection by DEP, Ranchi.

Inspection Charges: Prices quoted should be inclusive of Class Inspection Charges (IRS/ABS/LRS etc)/QAE inspection/DQA(WP) inspection/DND inspection or inspection required by any other Naval agency for Drawing Approval / QAP approval / Type Test / FAT / In-process Inspection / On board Inspection wherever applicable as per Class Rule / STOR requirement and will be arranged and paid by the Supplier directly to the Classification Agency. TPIA inspection charges shall be arrange and paid by GRSE directly to TPIA for the accepted items only.

16. Quality Control: By DQA (WP)/ DQA (N)/QAE (for indigenous Manufacturing items).

17. Commissioning Assistance/Service Engineer/ Training: Shall be provided by the firm as applicable as mentioned in the SOTR. Also, in case of installation problem observed during fitment on board by GRSE DEP, firm's representative is to be present/supervise, at no extra cost. Supplier's representative must be available at GRSE DEP for detect rectification / transit damage, if any.

18. Submission of Drawing / QAP: Submission of Drawings / QAP (Quality Assurance Plan) shall be done by supplier as per SOTRs / Drawings.



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19. Submission of Binding Data / Drawing, etc.as per SOTR: Submission shall be done by supplier as per SOTR & MOM of TNC within the time Limit mentioned in the SOTR & MOM of TNC.

20. Progress Report: Supplier will submit progress report/ bar chart initially within 2 months from the date of receipt of order and thereafter on monthly basis.

21. Detailed Break up Prices: Supplier on receipt of Purchase Order and by a date not later than 3 months from the date of receipt of order shall list out and confirm all deliverables including Main Equipment, Accessories, On board Spares, B&D Spares, Tools, Technical Documentation and other items. Each item shall have the supplier's part no. and break up price. The same is required essentially for incorporating GRSE material code nos. into the Purchase Orders and Computer Systems.

GRSE shall issue Purchase Orders / Amendment to the Purchase Orders incorporating the details from the firm with GRSE code numbers, individual prices etc. in advance of contractual delivery.

22. Liquidated Damages: For delay in delivery of materials along with Manuals, Certificates and Documentation beyond contractual delivery, LD will be applicable @ ½ % per week or part thereof subject to maximum 5% of the value of the order for the undelivered portion.

23. Penalty: Supplier will be liable to pay Penalty for late delivery/submission of Binding Data, Drawings & QAP as stated in the SOTR. The Penalty for late delivery shall be at the rate of 0.25% per week or part thereof of subject to maximum of 1% of the total order value. Such Penalty shall be deducted by GRSE DEP from their outstanding dues.

24. Risk Purchase: In case of unsatisfactory progress of supply at any point of time after placement of order GRSE reserve the right to cancel the order without assigning any reason and to procure the ordered material from any alternative source at your complete risk and cost.

GRSE also reserves the right to cancel the order forthwith without any financial implications on either side if upon lapse of 50% of the scheduled delivery time the progress of manufacture is not up to the satisfaction of GRSE/Owner and the failure on the part of the sub-contractor/supplier/vendor to conform to the delivery schedule is inevitable.

25. Force Majeure: Will be applicable as per CVC Guide Line as vetted by Ministry of Law.

26. Arbitration:

- (a) If at any time, before during or after the contract period, any unsettled claim, question, dispute or difference arises between the parties, upon or in relation to or in connection with or in any way touching or concerning this order, the same shall be settled/adjudicated through Arbitration to be conducted by a Sole Arbitrator, to be appointed by the parties on mutual consent, in accordance with the provisions of the Arbitration and Conciliation Act, 1 996.



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- =====
- (b) In the event the parties fail to mutually appoint a Sole Arbitrator within 30 days from the receipt of a request by one party from the other, then either of the parties may approach the Hon'ble High Court at Calcutta under the provisions of the Arbitration and Conciliation Act, 1996 for appointment of a Sole Arbitrator by the Hon'ble Court.
 - (c) Such arbitration shall, in all respects, be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 and the rules framed there under or any statutory modification or re-enactment thereof for the time being in force.
 - (d) The Award of the Sole Arbitrator shall be final, conclusive and binding upon the Parties.
 - (e) In the event of the death or resignation or incapacity or whatsoever of the said Sole Arbitrator if appointed by the parties mutually the said parties may again appoint a suitable Substitute Arbitrator in place of the erstwhile Sole Arbitrator to continue with the proceedings. In the event of appointment of the Sole Arbitrator by the Hon'ble High court at Calcutta on death or resignation or incapacity or whatsoever of the said Sole Arbitrator, either of the parties in this behalf, may make an application to the Hon'ble High court at Calcutta for appointment of a Substitute Arbitrator and the Hon'ble Court may pass such orders as it deems fit and proper.
 - (f) Also, in the event an Arbitration award is set aside by a competent court the parties may appoint a Sole Arbitrator mutually or on failing to appoint a Sole Arbitrator mutually within the statutory period then either of the parties may file an application before the Hon'ble High Court at Calcutta under the provisions of the Arbitration and Conciliation Act, 1996 for appointment of a Sole Arbitrator by the Hon'ble Court in accordance with the provisions of the Arbitration & Conciliation Act.
 - (g) The cost of the arbitration, fees of the arbitrator, remuneration of the stenographer and clerk, stamp paper etc. shall be shared equally by the parties, unless otherwise directed by the Sole Arbitrator. The venue of arbitration shall be at Kolkata and unless otherwise decided by the parties or by the Sole Arbitrator himself, the venue shall be the premises of Garden Reach Shipbuilders & Engineers Ltd. located at 43/46, Garden Reach Road, Kolkata 700 024.
 - (h) The language of the proceeding shall be in English.

27. Obsolescence / After Sales Support: Spares support for a period of 30 years from the date of commissioning of the ship is to be provided by the supplier to GRSE. In case of discontinuation of the model, adequate advance notice is to be given to GRSE by Supplier.

Repair/maintenance/service is to be provided by the firm at all major ports of India for a period of 15 years at extra cost from the date of delivery of the ship.

28. Product improvement: The supplier agreed to incorporate any improvement in the equipment either during the period of manufacturing or until commissioning of the ship on which equipment are fitted and such improvement shall be incorporated in this supply, free of cost.



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29. **Identification of Deliverables:** While dispatching the firm shall identify each item with GRSE code no. and the firm's part no. Packing list should indicate all deliverable items specifically mentioning/mounted on main equipment or loose items. Each item should be identified with metallic or plastic tag indicating both GRSE code no. and firm's part no. In case of deviation, GRSE shall not be in any way responsible for delay in issue of receipt inspection report and / or payment.

On-Board Spares should be PIP packed and to be supplied in separate boxes with clear identification and part number on metallic/ Plastic tags.

30. **Packing & Forwarding:** Shall be arranged by Supplier at their cost. However, Supplier to ensure that all materials are properly packed (Spares in PIP in a separate box) to withstand transit damage / pilferage during transit.

All OB Spares and B&D Spares are to be supplied in PIP Packing. OB Spares, B&D Spares and tools are to be supplied in separate boxes with clear identification and part numbers in metallic or plastic tag with identical description in the respective packing list(s). Each box shall have a separate packing list attached with the detailed description mentioned and marking done on it. Supplier's representative is required during receipt inspection of loose items, accessories, spares and tools for easy identification and detection of shortfall.

Packing List of Supplier shall compulsorily indicate the GRSE item codes and respective Supplier Item codes for each of the supplied items.

31. **Preservation / De-preservation:** Preservation/de-preservation/re-preservation, if applicable shall be conducted as per SOTRs and as agreed vide MOM of TNC. The firm should depute their reps. at the DEP, Ranchi for receipt inspection and repacking of the equipment at no extra cost.

Necessary consumables as considered essential, is to be supplied along with the equipment.

32. **Transportation & Way Bill:** Materials are to be dispatched by road. Ink-signed invoice and copy of consignment note along with packing list, Inspection release note, Guarantee/ warrantee certificates are to be submitted immediately after dispatch with 02 days from despatch. Invoice must incorporate value of goods, GST, HSN Code and Firm's GST No. Consignment note must incorporate relevant Invoice no./date. Transport charges will be borne by the firm. From 01 April 2018, E way bill is applicable.

33. **Transit Insurance:** Transit insurance will be arranged by supplier at their cost.

34. **Rejection Replacement:** Any equipment found defective/rejected, Supplier will collect the same from GRSE Stores, all incidental charges to be borne by them, within 30 days from the date of intimation to Supplier of such rejection.

GRSE reserves the right to dispose of the rejected items at the end of a total period of 90 days in any manner to the best advantage to GRSE & recover storage charges and any consequence damage from sale proceeds of such disposal.



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35. Individuality of Contract: This order shall be treated as an individual contract, shall not allow any general lien to the portions and shall not get any prejudice in execution due to situation arising out of some other contract that supplier may have entered into with GRSE.

36. Governing Jurisdiction: All contracts shall be deemed to have been wholly made in Kolkata and all claims there under are payable in Kolkata City and it is the distinct condition of the order that no suit or action for the purpose of enforcing any claim in respect of the order shall be instituted in any Court other than that situated in Kolkata City, West Bengal State, India.

37. Parts Identification List (PIL) / Manuals if any of the equipment as applicable should be submitted along with the delivery or as stipulated vide SOTR.

38. Order Acknowledgement: The supplier will acknowledge the Order within 7 days of its receipt by them. If no contrary advice is received within that period it will be deemed to have been accepted by you.

39. All other terms & conditions will be as per latest GRSE STACS (Indigenous equipment / machinery).

40. Validity of Offer:

(a) Main Equipment, OBS, Documentation, Services & Training: Firm's offer must be valid for a period of **180 days** from the tender closing date.

(b) Validity period of B&D spares: Firm's offer must be valid for a period of **15 months** from date of submission of B&D spare list along with CPL/PIL in ILMS format by the bidder.

41. Indigenization:

(i) As per Government of India, Make in India drive, to promote manufacturing & production of goods & service in India, bidder have more indigenization content will be preferred.

(ii) **Following bid qualification/Purchase preference criteria shall apply:**

(a) Among all qualified bids, the lowest bid will be terms as L1. If L1 is from local supplier, the contract/PO will be awarded to L1.

(b) If L1 is not from local supplier, the lowest bidder among the local suppliers will be invited to match the L1 price subject to local supplier's quoted price falling within the margin of purchase preference, and the contract/PO shall be awarded to such local supplier subject to matching L1 price.

(c) In case such lowest eligible local supplier fails to match L1 price, the local supplier with next higher bid within the margin of purchase preference will be invited to match the L1 price and so on and contract/PO shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference matches the L1 price, then the contract/PO will be awarded to the L1 bidder.



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(iii) **Minimum local content:** The minimum local content shall be 50%. The bid which has local content less than 50% will be rejected.

(iv) **Margin of Purchase preference:** Margin of Purchase preference shall be 20%.

42. **Web Clause:** Bids are required to be submitted in **TWO** parts (Techno-Commercial bid & Price bid) in e-procurement mode through our e-portal <http://eprocuregrse.co.in> wherein all **Data Sheets** are available for download. Bidders need to download all Data sheets from the e-portal, fill-up and upload the same, using their Digital Signature Certificate (DSC). Price bid needs to be filled up in the given price bid data sheet only, if any other attachment regarding price is found, the offer will be treated as cancelled. A blank copy of Price bid is to be attached along with Techno-Commercial bid so as to verify that the items quoted confirm to the tender and SOTRs.

A] **The Part A:** Techno-Commercial Bid should only contain the Technical & Commercial offer. No price should be mentioned in this part of the bid else your tender would be rejected outright. Following are to be enclosed with the Techno-commercial Bid.

- i) Technical bid in duly filled & signed condition as per attached excel format **Annexure – A.**
- ii) Acceptance to the commercial terms and conditions in duly filled & signed condition as per attached excel format **Annexure - B.**
- iii) Acceptance Matrix of Instruction to Bidders in duly filled & signed condition as per attached excel format **Annexure – I.**
- iv) Acceptance Matrix of SOTR in duly filled & signed condition as per attached excel format **Annexure – II.**
- v) A blank copy of Price Bid (without mentioning prices) must be submitted with techno-commercial bid to verify the contents of price bid other than the price.
- vi) **Deliverables:** as indicated in the SOTR attached vide the tender shall be binding, in case, the same is not available in the Indent break-up list vide templates of Technical and/or Price Offer, Bidders should quote the same respectively in the separate sheet named as "Details" available in the Technical/ Price offers templates.
- vii) **B&D Spares:** Offer for B&D Spares may please be submitted vide respective Annexure in Price Offer templates with details as per ILMS format, if in case the same falls under the Scope of Supply as per SOTR.
- viii) **A GA drawing of layout of ship side of exhaust system with IRSS device and schematic drawing of ship side exhaust system with IRSS device for 1MWDA of P17A to be submitted along with the techno-commercial bid.**

B. **The Part B:** Price Bid should contain only the price & should be in separately sealed cover so marked as per attached excel format **Annexure-C.** This part will be opened only after acceptance of your Techno-Commercial bids. Price (in INR) based on F.O.R. GRSE should be fixed & firm till execution of order in full. **Price variation clause will not be acceptable.**



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43. Contact: Bidders may contact Mr. Sudarshan Tigga, Mgr.(P&S) (tigga.sudarshan@grse.co.in) for any Technical clarifications.

44. A pre-bid meeting, for technical clarification, will be conducted on **10.10.2022 at 10.30 AM.**

(a) The meeting will be conducted through WebEx (video conferencing).

(b) Alternatively, interested vendors may visit our office as above on 10.10.2022 at 10.30 AM. Vendors intending to attend pre-bid meeting will have to mail their request for participation at least two days in advance i.e. by 08.10.2022, to email id tigga.sudarshan@grse.co.in, paul.anjan@grse.co.in, singh.dkj@grse.co.in.

45. CANCELLATION OF ORDER:

(a) The Purchaser reserves the right to cancel an order forthwith without any financial implications on either side, if on completion of 50% of the scheduled delivery/Completion period the progress of manufacture/Supply is not to the satisfaction of Purchaser and failure on the part of the Bidder/Supplier/Contractor to comply with the delivery schedule is inevitable. In such an event the Bidder/Supplier/Contractor shall repay all the advances together with interest at prevailing bank rates from the date of receipt of such advances till date of repayment. The title of any property delivered to Purchaser will be reverted to the Bidder/Supplier/Contractor at his cost.

(b) In case of breach / non-compliance of any of the agreed terms & conditions of order / contract. GRSE DEP reserves the right to recover consequential damages from the Supplier / contractor on account of such premature termination of contract.

(c) In case of delay beyond agreed period for liquidated damages or 10 weeks from contractual delivery period whichever is earlier, GRSE DEP reserves the right to cancel the order and procure the order items / services from any available source at GRSE DEP's option & discretion and entirely at your risk and cost. Extra expenditure incurred by GRSE DEP in doing will be recoverable from Bidder/Supplier/Contractor.

46. Bid Qualification criteria:

(a) Bidder's design and manufacturing facilities must be approved by an IACS member/Government agency for designing and manufacturing of engine exhaust systems for marine application.

(b) Bidders should have prior experience of supplying exhaust silencers which is an important component of any Diesel Engine exhaust system.



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47. **Bid Rejection Criteria:** Bidders should ensure to confirm their unconditional acceptance to the following specifically, as deviations taken in any of the said terms may lead to rejection of their offer:

- (a) Acceptance to Submission of SDBG/ PBG and clauses of Payment Terms (Uneven Payment terms & Security Deposit shall be loaded with prevailing/promulgated rate of interest of GRSE.
- (b) Acceptance to clauses of Liquidated Damages, Risk Purchase, option clause, Force Majeure and Arbitration.
- (c) Acceptance to clauses of Replacement of Rejection, Guarantee/Warranty and After Sales Support.
- (d) Acceptance to required Inspection, Test Certification etc. (as per SOTR), Delivery Schedule and Validity (as above)
- (e) Submission of Technical Offer/Literature along with Compliance Matrices/Templates and B&D List in ILMS format.
- (f) Non-submission of GA drawing of ship side exhaust system with IRSS device and schematic drawing of ship side exhaust system with IRSS device for 1MWDA of P17A along with Techno-commercial bid.

48. **Part Order:** GRSE reserves the right to place order on Part-Order basis.

49. **Mode of Dispatch:** Road/Rail/Air/Sea.

50. **Consignee:** (a) Material scheduled for delivery are to be delivered at MDL & GRSE. However, exact details will be indicated in PO.

<u>MDL:</u>	<u>GRSE:</u>
MDL's either of Anik/Sewri/Bond/Electronic store located in Mumbai. However, exact details will be indicated in PO.	Main unit, 43/46, Garden Reach Road, Kolkata 700024. Garden Reach Shipbuilders & Engineers Limited. Ph. 033 2469 8100 Fax. 033 2469 8150

51. **PRICING:**

(a) Prices of all items/services listed in the price sheet format of the tender enquiry for delivery of the items/services as under:

Items/services	MDL Order (for 4 Ship sets)	GRSE Order (for 3 Ship sets)
Main Equipment	MDL, Mumbai Store	GRSE, Kolkata Stores.
Installation & commissioning	MDL Yard	GRSE yard

(b) The prices quoted shall remain firm and fixed till completion of the order / contract unless agreed otherwise by GRSE DEP. Packing, Forwarding and Transportation charges should be included in the quoted price. Insurance shall be arranged by the bidder at their own cost.

(c) Packing details such as size, weight etc. of the equipment/items to be mentioned.



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52. Wherever any clause in the 'Instructions to Bidders' conflicts with similar clauses elsewhere, the clause in the 'Instructions to Bidders' prevails.

Note :

(i) In case your offer is not submitted through e-portal <http://eprocuregrse.co.in> wherein all Data Sheets are available for download then the same is liable to be rejected.

(ii) Techno commercial offer will be opened on due date indicated above. Please depute your rep.



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ANNEXURE – II

STATEMENT OF TECHNICAL REQUIREMENT (SOTR)

1. **Responsibility:** The supplier of the Ship Side Exhaust System for 1MWDA will be responsible for design, manufacturing, supply and erection/installation & commissioning onboard and testing of such equipment including training, documents and any such information required by GRSE DEP to meet the following specified performance requirements:

- (a) The ship side exhaust system of the DA shall be **Sea Water injection** based and also serve as IRSS system by ensuring cooling of DA exhaust gases prior their discharge. Shiplside exhaust with sea water injection should be designed to ensure that the temperature of the exhaust gas at the exit of the shiplside should always be **below 100°C** at all power outputs of DA.
- (b) Water outflow at ship side exhaust system must be at specified temperature and have a throw off less than **0.5 meter**. The quantity of water throw at exit of IRSS is to minimized through a robust design with an efficient system with a drain.
- (c) Ship side exhaust system with IRSS device must be with minimum possible radiated heat load as well as minimum possible Air Borne noise.
- (d) Surface temperature of the ship side exhaust ducts at any location of the ship must be **within 60 deg C**.
- (e) Maximum allowable back pressure (mbar): **50 mbar**.
- (f) Supplier has to demonstrate the achievement of design exhaust gas flow and temperature performance with throw off less than 0.5 meter.

2. **Quantity and Delivery schedule:** as mentioned in page no 4 of NIT.

3. **Scope of Supply:**

Table 1

Sr.	Description	Quantity	Unit
(A).	Diesel Generator Ship Side Exhaust System with accessories, comprising mainly the following items (but not limited to):	28	Set
	(i) Exhaust duct/pipe (SS 316)		
	(ii) Compensators/ Bellows (SS 316)		
	(iii) Primary silencer (SS 316)		
	(iv) Flexible supporting assembly / Mounting brackets with fixed and Sliding supports		
	(v) Instrumentation assembly		
	(vi) Thermal insulation assembly		
	(vii) pressure sensor for measuring exhaust back pressure		
	(viii) Temperature sensor		
	(ix) Different size/type of fasteners (SS 316), gaskets & consumables		
(B)	IRSS device (water cooled) with accessories and its cooling arrangement, comprising mainly the following items (but not limited to):	28	Set
	(i) IRSS device (Titanium)		
	(ii) Primary injector (Titanium)		
	(iii) Exhaust duct/pipe (Titanium)		
	(iv) Main silencer (Titanium)		



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	(v) Hull valve (Titanium)		
	(vi) Hull penetration assembly		
	(vii) CAP assembly (Titanium)		
	(viii) Flexible supporting assembly / Mounting brackets with fixed and Sliding supports		
	(ix) Instrumentation assembly		
	(x) Pump, Motor Assembly with control/starter panel		
	(xi) valves & header assembly		
	(xii) Control system assembly		
	(xiii) Thermal insulation assembly		
	(xiv) Temperature sensor		
	(xv) Different size/type of fasteners (SS 316), gaskets & consumables		
(C)	Exhaust Y-Piece (SS 316) with all different size/type of fasteners (SS316), Gaskets & consumables.	20	Nos
(D)	Onboard spares & tools for 1 year	7	Set
(E)	B&D spares for 4 ships of MDL	1	Set
(F)	B&D spares for 3 ships of GRSE	1	Set
(G)	Commissioning spares	7	Set
(H)	Documentation	7	Set
(I)	Service engineer for erection/installation & commissioning	7	Lot
(J)	Training	7	Lot

NOTE: All the items are to be delivered to the respective shipyard except Exhaust y-piece with all different size/type of fasteners (SS316), Gaskets & consumables. Exhaust y-piece, being an integral part of 1MWDA, are to be delivered to DEP Ranchi.

4. DA Exhaust System:

(a) Instead of conventional vertical exhaust system (through the ship's funnel), the DA's of P- 17A are envisaged to have Ship Side Exhaust System (routed through the ship sides). The DA exhaust uptakes along with the Shiplside Exhaust System are in the scope of supply of the DA manufacturer. The ship side exhaust system of the DAs shall be **Sea Water injection** based and also serve as IRSS system by ensuring cooling of DA exhaust gases prior their discharge. Shiplside exhaust with sea water injection should be designed to ensure that the temperature of the exhaust gas at the exit of the shiplside should always be **below 100°C** at all power outputs of DA.

(b) The supplier will be responsible for integration of the ship side exhaust system for DAs including its support systems. GRSE DEP will obtain all necessary data from the ship side exhaust supplier for the same. Overall responsibility of the performance of the Ship Side Exhaust & IRSS system shall rest solely with the ship side exhaust supplier/designer.



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(c) The DA exhaust system is to be designed to withstand the exhaust gas temperatures and exhaust gas flow from DAs across all loads and the Ship Side Exhaust System characteristics. The entire system should be thermo-acoustically designed so as to ensure the minimum possible radiated heat load as well as minimum possible Air Borne noise in the affected compartment where the exhaust trunks shall be routed to carry the exhaust gases to ship sides. The operation of DA Ship Side Exhaust system should not have any adverse effect on the performance and life of the DAs.

(d) The support systems and the temperature control of DA Shiplside Exhaust system shall be designed so as to optimally integrate with DA and ship's support system.

(e) Suitable 'U' bends / goose necks will have to be provided in the exhaust system to avoid water ingress during heavy sea. The DA support system such as DA exhaust system and DA turbochargers are to be designed so as to ensure the overall ship side exhaust system as well as DA performance is not affected due to high back pressures or any other issue which may eventually result due to Ship Side Exhaust arrangement.

(f) The system design including the insulation design should ensure the surface temperature of the ship side exhaust ducts at any location of the ship should be **within 60 deg C**. Recommended lagging material for DA uptakes as well as ship side exhaust ducts is to be clearly indicated in techno-commercial offer. **All exhaust silencers, ship side exhaust heat exchangers, ducts, Goose necks, u-bends, IRSS pump, motor, starter/control panel, exhaust back pressure sensor, temperature sensors, controls, interface connections, counter fittings, end connections, thermal insulation, flexible & fixed supports, all types of fasteners, flexible rubber hoses, flexible metallic hoses, gaskets, valves, flexible connections at inlet and outlet of IRSS pump, filters, flexible connections, consumables etc. required in the ship side exhaust system with IRSS device are in the scope of supply of the ship side exhaust vendor.**

(g) The design & supply of exhaust system including IRSS system provisioned by integrator will be validated by DA vendor as per engine requirements and shipyard will ensure Installation of the same as per validated design. Installation instructions will be provided by the ship side exhaust supplier & any technical clarification further required for installation of ship side exhaust system will be sought by the shipyard/GRSE/DEP.

(h) The DA exhaust system (including ship side exhaust system heat exchangers) should use anti-corrosive material and have minimum maintenance requirements. The heat exchangers used should be compact, rugged and easy to maintain. Periodic Flushing through requirements in ship side exhaust system **sea water heat exchangers** should be clearly indicated and design must facilitate **ease of flushing** and other maintenance routines onboard.

(i) Unless otherwise approved, each engine will have independent exhaust trunking. Trunking size is to be based to limit the gas velocity to 100-150 ft/sec and to minimize exhaust backpressure.

5. Following are the inputs for the design which is inexhaustive. However, vendors must ask for the additional parameters required prior designing the system:

(a) Engine parameters:

(i) Engine make and model: MTU12V396TE54



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(ii) Engine Exhaust Volumetric Flow Rate: 18000 m³/hr @ 585 °C

(iii) Max. Engine Exhaust Gas Temperature: 585 °C

- (b) **For design of Exhaust compensator/exhaust metallic bellow:** Exhaust compensator/exhaust metallic bellow of ship side exhaust system with IRSS device of 1MWDA for P17A ships must comply the following deflection values at different loading conditions at different orientations/positions with respect to DA i.e. at transverse position with respect to DA, at longitudinal position with respect to DA and at vertical position with respect to DA:

	continuous duty loading conditions A1-A4			exceptional external loading condition B1-B4 and C1-C3			shock loading conditions SH1-SH3		
	U _{rad} [mm]	-U _{ax} [mm]	+U _{ax} [mm]	U _{rad} [mm]	-U _{ax} [mm]	+U _{ax} [mm]	U _{rad} [mm]	-U _{ax} [mm]	+U _{ax} [mm]
exhaust gas outlets / air intakes (transversal)	13,3	-38,8	38,8	57,3	-99,9	99,9	38,5	-28,0	26,1
exhaust gas outlets / air intakes (longitudinal)	38,9	-12,0	12,0	99,9	-55,7	57,3	38,5	-10,9	10,3
exhaust gas outlets / air intakes (vertical)	39,6	-5,7	5,7	99,9	-35,1	22,5	28,0	-37,5	38,5

6. Indicative DA exhaust system with material specifications for P-17A is as follows:

Sr. No.	COMPONENT	MATERIAL
1.	Compensator No. 1	Stainless steel AISI 316
2.	Exhaust pipe No. 1	Stainless steel AISI 316
3.	Primary silencer	Stainless steel AISI 316
4.	Exhaust pipe No. 2	Stainless steel AISI 316
5.	Compensator No. 2	Stainless steel AISI 316
6.	Exhaust pipe No. 3	Stainless steel AISI 316
7.	Primary injector	ASTM Titanium Gr. 2
8.	Exhaust pipe No. 4	ASTM Titanium Gr. 2
9.	Main silencer	ASTM Titanium Gr. 2
10.	Exhaust pipe No. 5	ASTM Titanium Gr. 2
11.	Compensator No. 3	ASTM Titanium Gr. 2
12.	Exhaust pipe No. 6	ASTM Titanium Gr. 2
13.	Hull valve	NAB
14.	Hull penetration assembly	Steel / Inconel
15.	CAP assembly	Polyurethane
16.	Flexible supporting assembly	Stainless steel AISI 316
17.	Instrumentation assembly	Composite
18.	Sea water supply pump assembly	Composite
19.	Regulating valve assembly	Composite
20.	Control system assembly	Composite
21.	Thermal insulation assembly	Composite



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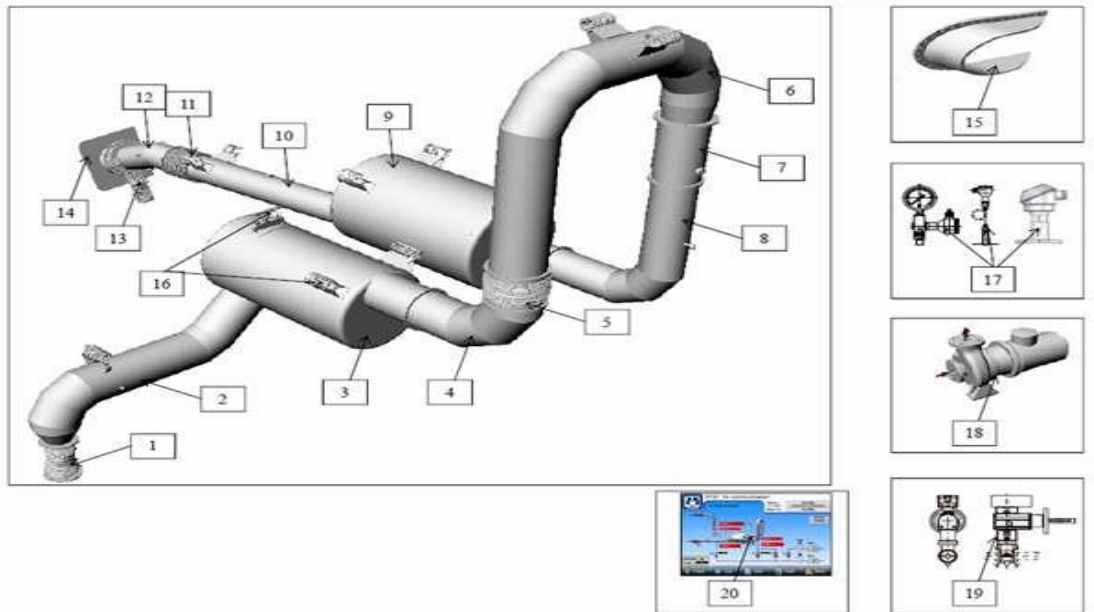
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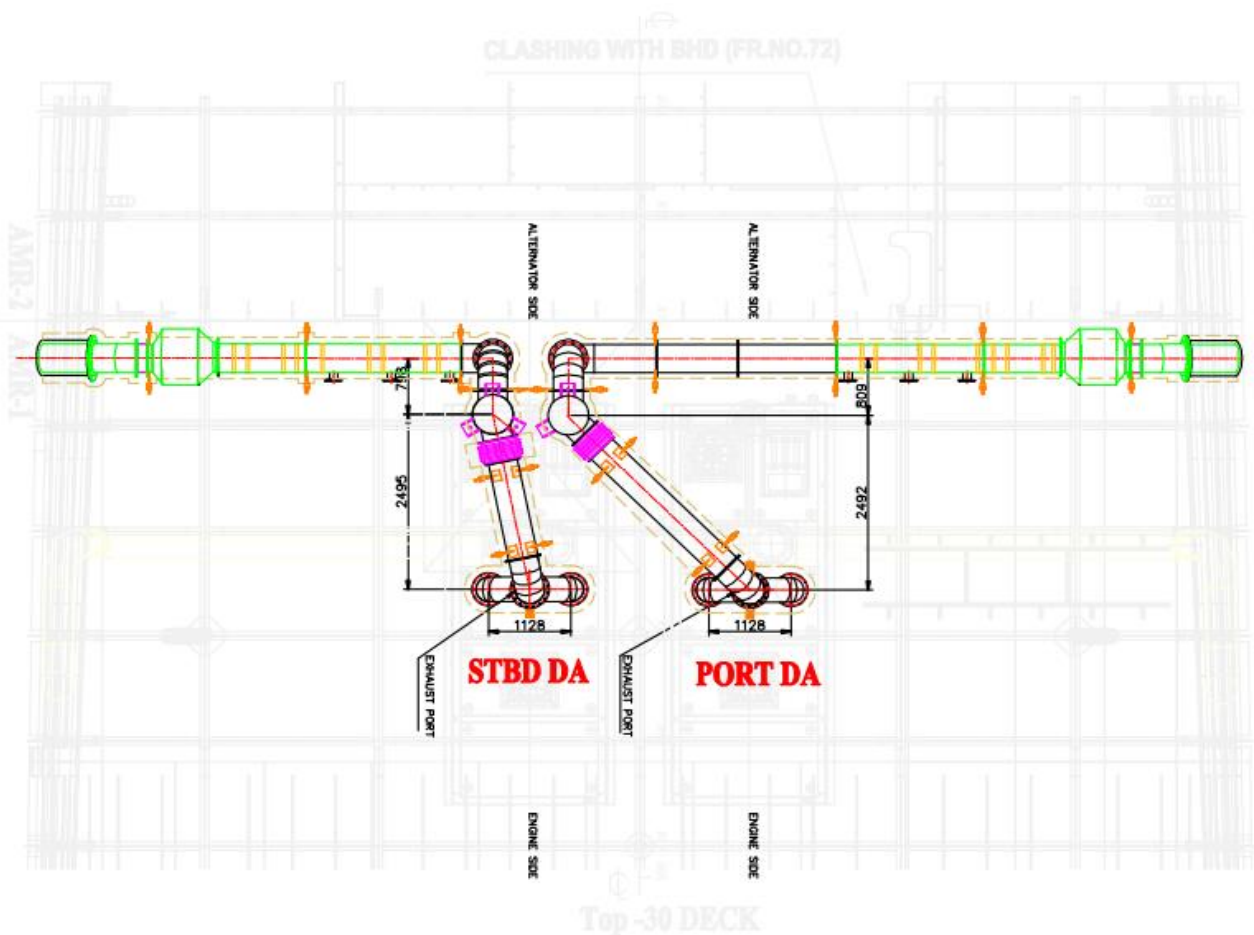
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7. An indicative GA drawing of ship side exhaust arrangement in P-17A ships is shown below:



Ship side Exhaust Layout



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8. **Silencers:**

- (a) The silencer shall be circular type.
- (b) The silencers to be installed on the exhaust gas duct of the DG set. The noise residue after the silencers at the rated output shall be in compliance with the maximum airborne noise of the enclosure.

9. **Inspection Authority:**

- (i) Ship side exhaust trunking will be inspected by DQA(WP)/QAE/IACS/TPI. If any additional expenditure is required for inspection by IACS/TPI then the same will be borne by GRSE DEP.
- (ii) IRSS being a critical system, main sub-assemblies viz. pumps, control/starter panel, nozzles and valves (100mm and above) will be inspected through DQA(WP).

10. **Inspection and testing:** Inspection & testing shall be carried out Individual for each Ship Side Exhaust & IRSS system.

11. Sample material will be tested at NABL accredited lab and NABL lab test certificates to be provided by the supplier.

12. **FATs (Factory Acceptance Trials) / ATP (Acceptance Test Procedure):**

Performance test of all units of Ship side exhaust system with IRSS device and its auxiliary item to be carried out onboard ship after installation & commissioning along with DA trial in presence of IHQ/ QAE/ WOT/ DEP and shipyard to prove following:

- (a) Exhaust gas temperature at the exit of shipside must be less than 100°C at all power outputs of DA.
- (b) Exhaust gas back pressure must be less than 50mbar.
- (c) Water outflow at exit of ship side exhaust must have a throw off less than 0.5 meter.

13. **Type Testing Requirement:** The first of each type of equipment is to be type tested and each successive unit is to be production tested at the manufacturer's works. In addition, extended endurance testing of prototype equipment is required to be carried out before approval for their use on board. The supplier should also furnish data/information about the methods/measurements carried out in evaluating the performance of the equipment during the trials. These type tests are applicable to equipments/parts/systems which are newly introduced and are not proven earlier, including electrical Equipments like IRSS pump, motor & IRSS panel etc. For details on Type Testing refer **Annexure – 5**.

14. **Shock Qualification:**

- (a) The equipment installed on board the frigate would be required to be qualified for shock loads due to non-contact underwater explosions as per the requirements of the Shock Standards of the IHQ MoD (Navy).
- (b) The equipment should be designed to comply to the requirements as stated in BR 3021 specification, as amended by the IN to replace NSS1 grade curves by IN shock grade A curve placed at **Annexure – 6**. Test certification and information on the Inherent Shock withstanding capacity of the equipment should be provided as part of the technical offer. Shock Response Spectrum for the resiliency mounted equipment will be derived from the IN Shock Grade "A" curve. The shock input parameters derived from the shock grade curve will be applicable at the interface of the equipment foundation and the mounts. Detailed shock calculations for the equipment with the chosen mounting arrangement, indicating compliance to the specified shock grade should be provided on placement of order, prior to FATs.



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15. **NOISE & VIBRATION:** Design of the equipment along with its associated auxiliaries/accessories/controls and mounting system, should ensure minimal vibration and noise. All components of the equipment and accessories are to be designed for ensuring resistance to misalignment due to forces of vibration. Suitable flexible hoses, bellows and noise reduction clamps are to be used for associated piping connections with the main equipment/auxiliaries.

- (a) **Structure Borne Noise:** The structure borne noise levels must be less than the targets as specified at **Annexure – 7**. The table shows the maximum acceptable vibration levels above the mounts in all three directions (vertical, longitudinal and horizontal). For Two Stage Mounting arrangements, the Vibration levels above the lowest stage of mounts would be considered for determining the acceptance criteria. The expected vibration levels above the mount (as dB acceleration ref $1e-5$ m/s² in the 1/3 Octave Band) under ordinary operating conditions in the frequency range of 10 Hz to 10 kHz are to be provided along with the technical offer. All noise and vibration values of equipment and mount stiffness values need to be guaranteed, measured during Factory Acceptance Trials (FATS) and recorded measurements must be forwarded to IHQ, MoD(N) / DND in graphical and digital format. The instrumentation, measurement, analysis and presentation of measured data are to be undertaken in accordance with MIL STD 740-2. Narrow Band Vibration levels above the mounts are also to be recorded and forwarded to IHQ MoD(N)/DND.
- (b) **Airborne Noise:** The Airborne noise levels for the equipment should comply with the levels specified in **Annexure – 7**. The expected airborne noise levels expressed as Sound Pressure Levels (dB ref 20 Micro pascals in the 1/3rd Octave band) as well as Sound Power Levels (dB ref $1E-12$ W in the 1/3rd Octave Band) under ordinary operating conditions in the frequency range 10 Hz to 10KHz are to be provided along with the technical offer. The compliance to the specified Air Borne noise levels are to be guaranteed during the technical offer and demonstrated during Factory Acceptance Trials (FATS). The instrumentation, measurement and analysis of airborne noise during FATS would need to be undertaken in accordance with BS EN-ISO 9614-2 (Sound Intensity Method).
- (c) SBN and ABN measurements of the integrated equipment are to be measured at the DA integrator's premises in order to avoid delays in proving of performance of integrated equipment onboard.

16. **NOISE LEVELS IN MACHINERY SPACES:** Permissible noise levels in machinery spaces are to be in accordance IS 13161 (Part 3).

17. **SHOCK & VIBRATION MOUNTS:**

- (a) For resiliently mounted equipment, the mounting system shall be capable of attenuating the shock impact below the inherent shock resistance characteristics of the concerned equipment. The installation and connections of the equipment shall account for the extreme displacements that may occur under shock conditions. Wherever necessary, suitable stops/snubbers shall be provided to prevent excessive motion. Shock and Vibration mounts selected for the equipment should meet the following requirements:
- (i) Natural frequency under nominal load < 7Hz
 - (ii) Mount should be loaded to 70-90 % of its rated nominal load.
 - (iii) Permissible mount displacement > Maximum shock displacement calculated for the equipment in accordance with the specified shock grade.



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(iv) Residual acceleration transmitted through the mounts after attenuation should be less than the inherent shock withstanding capability of the equipment.

(b) Following data/details with respect to shock & vibration mounts are to be submitted by the equipment supplier, along with the Binding Data:

- (i) Type and quantity
- (ii) Characteristics (including dimensions)
- (iii) Footprint indicating position of mounts
- (iv) Dynamic stiffness of mounts: 1/3rd Octave band level (10 Hz to 10 kHz)
- (v) Transmissibility: 1/3rd Octave band level (10 Hz to 10 kHz)
- (vi) Rated load, deflection in three axis and natural frequency
- (vii) Shock acceleration: with and without the resilient mounts.
- (viii) Resilient Mounting Calculations.
- (ix) Shelf life for each type of Shock Mounts & Shock Mounts grouping procedure is to be indicated in the offer.
- (x) Procedure to preserve the Shock Mounts and their installation on Board the ship shall be given in the Installation document of the equipment.

18. **Resilient Mounting Calculations:** The supplier shall perform & submit for approval calculation of the elastic mounting system behavior & characteristics under normal operating & extreme conditions, to demonstrate the adequacy of the mounting arrangement with regard to noise attenuation and shock requirement.

These calculations should indicate:

- (a) System resonance frequencies,
- (b) Relative displacements of the module & their relationship with the design of the flexible coupling, the flexible connections & the installation clearances under operating & extreme conditions.

19. **Documentation:** Various documentation will be submitted by the equipment supplier as per the scope of supply and responsibility. Documentation to be submitted by the equipment supplier are broadly indicated below:

Table 2

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

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



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Following file/formats would be acceptable:-

- (a) MS-WORD for text files
- (b) EXCEL for spreadsheet files
- (c) ACCESS for data base files
- (d) Orthographic drawings (2D) in DXF/DWG format
- (e) 3D model of equipment (associated components) in AVEVA MARINE/.STP format.

21. Overall documentation must be of high quality in terms of contents, clarity and completeness for meeting the requirements of detailed design, integration, manufacturing, quality assurance, installation, trials and operation/maintenance of the equipment. The format and content of documentation being provided shall be as per DME specifications 452, JSS-0251-01 & EED-S- 048, as applicable.

22. One set of all types of documentation shall be submitted by equipment supplier in hard and soft form (CD-ROM) per engine. Drawings/data are to be submitted in soft copies in latest software version.

23. **Binding Design Documentation:** Comprehensive list of binding design documentation is to be submitted by equipment supplier, in a structured manner under various levels (I, II & III), along with time schedule. Binding Data is to be supplied by the OEM within 01 month of placement of order. QAP (**Quality Assurance Plan**) needs to be submitted by the firm to DEP, GRSE Ranchi within 1 week on approval of binding data as per naval standard (QAD standard) for approval by DQA (WP) or QAE agency. **A separate QAP of valves to be submitted by exhaust supplier to GRSE DEP for approval.** Indicative list (**but not limited to**) is mentioned below:

Table 3

S No.	DRAWINGS / DOCUMENTATION
Level I: Submission within 15 days of placement of order by GRSE/DEP	
(a)	Technical description on main equipment along-with associated auxiliaries/components with operating principle
(b)	General arrangement drawing of equipment and major sub-assemblies along with footprint in 1:25 or appropriate scale.
(c)	Assembly drawings of main & associated auxiliaries/components including:- <ul style="list-style-type: none"> • Main dimensions • Mounting arrangement (including details on shock mounts) • Bolting plan • Position & dimension of all Interface details • Operational and maintenance envelopes • Weights • Materials with their specifications • Centre of gravity & lifting points • Flow rate & direction • Etc.
(d)	Equipment performance data/Exhaust back pressure calculation & confirmation



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(e)	Characteristics data, curves, efficiency, etc., related to equipment performance
(f)	Heat emission data
(g)	Equipment support systems functional specifications, as applicable along with schematic drawings (such as starting, fuel, lub oil, compressed air, intake, uptake, cooling, hydraulic, vents/drains, controls/monitoring, etc.) including interfaces with shipboard systems
(h)	Data/details for equipment foundation design and interfaces with ship structure
(j)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable
(k)	Detailed QAP
Level II: Submission within 01 month of placement of order by GRSE/DEP	
(a)	Equipment model testing report, as applicable (e.g., propeller model testing report)
(b)	Equipment control & monitoring data/details along-with structured list of sensors, signals & instrumentation (including in-built sensors for online health condition monitoring)
(c)	Control & monitoring interface data/details for interface with other propulsion equipment and ship's IPMS
(d)	Applicable design input data/details and mathematical model of equipment for undertaking dynamic simulation & analysis of Equipment, by IPMS supplier
(e)	Electrical specifications & wiring diagrams for associated electrical components, local control panels, etc.
(f)	Detailed definition of all terminal points and interfaces, major terminal box diagram, winding & performance data sheet.
(g)	Shock qualification data/details
(h)	Noise and vibration data/details
(j)	Any other design data/details, calculations, analysis, specifications, drawings, etc., as applicable
Level III: Submission within 02 months of placement of order by GRSE/DEP	
(a)	Installation drawings, with interfaces and tolerances; main equipment along-with associated auxiliaries/components along with seat machining requirement & torque value of bolts which are tightened in situ.
(b)	Equipment alignment calculations and its procedure
(c)	Shipping/Unshipping requirements
(d)	List of special tools, instrument, Handling & lifting gear (including jigs & fixtures), as applicable forming part of deliverables and associated procedure
(e)	Flushing requirements and procedure for equipment and its support systems
(f)	Preservation, re-preservation and upkeep procedure; including requirement of preservatives (oils, greases, etc.) with international or NATO equivalents along with chemical composition and physical properties.



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(g)	Shock qualification report for proving shock capability of the equipment
(h)	Vibration Analysis; Torsional, Lateral & Longitudinal, as applicable
(j)	Reliability, Maintainability and Availability analysis
(k)	Failure Mode and Effect Analysis (FMEA)
(l)	Training plan
(m)	Any other documentation, as applicable
(n)	Mass elastic diagram giving details of all rotating parts with their inertia and stiffness

24. **Applicable Standards:**

Table 4

Following standards/specifications or their equivalent International Standards as per their latest issues/versions shall be applicable for OEM for designing their equipment

(a)	IN Shock grade 'A' (BR 3021)	Requirements for High Impact Shock Tests, Shipboard Equipment and Systems (PLACED AT END OF DOCUMENT)
(b)	JSS 55555	Environmental Specifications for ship borne machinery (only for electrical items)
(c)	MIL-STD-167-1(A)	Mechanical Vibrations of Shipboard Equipment
(d)	MIL-STD-1474E –D MIL-STD-740 (SH)	Airborne and Structure borne Noise Measurements and Acceptance Criteria of Shipboard Equipment
(e)	MIL-STD-461 E/F	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
(f)	NES 313	D i e s e l E n g i n e s f o r M a r i n e Propulsion and Auxiliary Machinery
(g)	ISO 12063 (1987)	Classification of Degree of Protection provided by enclosures of Electrical equipment.
(h)	MIL-PRF-32216	Technical Manuals
(j)	IMO	MARPOL TIER II
(k)	BS-EN ISO-9614	Determination of Air Borne Noise (Sound Power Level) using Sound Intensity Method
(l)	EED-Q-242 REV 2	Requirements for the Alternators
(m)	EN-ISO 9614-2	Sound Intensity Method for measurement of ABN during FATs
(n)	NES 1004	Environmental Conditions
(p)	NES 511	Standard Electrical and Environmental Tests
(q)	Def Stan 723	Tally/diagram plates
(r)	DGS 251	Painting
(s)	IS 2147	Starter/ control panel enclosure
(t)	Def Stan 02-501	General requirement for design of electro-mechanical equipment.
(u)	EED-Q-071 (Rev-4)	Electrical specification for A.C. Motor & starter



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NES 313 will be the guiding document for the design and construction of the diesel alternator. Deviation if any, from the above must be demonstrated to be technically equal to or better than the specified requirements.

25. **Documentation Associated with Quality Assurance Plan, Equipment Manufacturing & FATs:** Documentation associated with quality assurance plan (QAP), equipment manufacturing and FATs, will be submitted by the equipment supplier in time bound manner, well in advance for approval by the designated inspection organization.

(a) Supplier will prepare the QAP in-line with the sample master QAP (refer **Annexure – 1**) enclosed with the SOTR.

(b) After completion of FATs, reports to be submitted to GRSE/DEP.

26. **Documentation Associated with STW/HATs/SATs:** Documentation associated with equipment setting to work (STW)/Harbour acceptance trials (HATs)/Sea acceptance trials (SATs), shall be submitted by the equipment supplier within the agreed time schedule.

(a) 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 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.

27. **Detailed installation documents:** Supplier of ship side exhaust system should submit the detailed installation documents regarding procedure of installation of exhaust duct in the DA compartment, positioning of flexible and fixed support if any to support the duct etc.

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

(a) Under operating instructions, pre-starting inspection/checks, starting & shutdown procedures, functional parameters, trouble shooting, fault analysis, precautions, etc. to be suitably covered. Procedures for undertaking all maintenance routines till the end of service life (including major overhaul), are to be clearly specified along with preservation/de-preservation & upkeep requirements (when equipment is not in use, during long refit of ship). Procedures for setting to work, test & trials of equipment are also to be well documented. All mandatory replacement parts required for maintenance is to be indicated. Test and trial documentation covering installation checks, pressure test, vacuum test, cut outs and set to work and load trials as applicable are to be provided by the manufacturer.



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- (b) One set of the following technical manuals/documentation shall be provided by the equipment supplier along with equipment supply in hard and soft form (CD-ROM) per engine.

Table 5

Description	Content
Technical Manuals	Technical Description and Operating Instructions Manual
	On board Maintenance Manual
	Field and Depot Maintenance Manual
	Installation and Testing Manual
	Parts and Tools Catalogue including CPL & PIL in ILMS/SLMS Format
Technical Documentation	Installation Drawings
	As fitted Drawings
	Applicable Standards Utilized
	Test Procedure and Documentation
	Certified Test Reports (FATs, Material Test Certificates, Calibration Certificates, Weight Certificate etc.) & Records (including Type Test Certificate).

- (c) The above mentioned documents shall be completed with the following information: weight, center of gravity, electric motor power absorption, lubricants and greases normally used, service temperature, design temperatures, service and design pressure of components under pressure (cylinders, filters, coolers), where applicable and the following in general:

29. **Drawings.**

- (a) Dimensional outline drawings (in metric units), of all major assemblies showing overall and principal dimensions in sufficient details to establish the extent of space required in all directions for installation, operation and maintenance to a scale of 1:25.
- (b) As fitted drawings dimensioned and labelled with keys providing description and part numbers of each major component and subassembly including control system equipment. The drawing is to include GA drawings of equipment and major sub-assemblies.
- (c) Assembly drawings of all individually mounted units; these are subject to the purchaser approval before release for manufacture.
- (d) Mass elastic diagram giving details of all rotating parts inertia and stiffness.
- (e) Sectional assembly drawing and isometric view of all major components.
- (f) Hydraulic and lubrication schematic drawing indicating flow direction and fitting details.
- (g) Control and monitoring system diagram showing interlocks.



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- (h) Position and dimension of all mechanical interfaces / terminal points.
 - (i) The position of the center of gravity and lifting points of the equipment.
 - (j) Mounting arrangement of each individual sub assembly.
 - (k) Wiring diagram and connection diagram for all junction boxes and control panels.
 - (l) Winding diagram of generators.
 - (m) Control and monitoring system circuit diagram, showing interlocks.
 - (n) Location, type, dimension of cable entrance plates, connectors, etc.

30. **Documentation.**

- (a) General information & Technical/Design Specifications of the equipment.
- (b) Operating Instructions viz. starting, precautions during running, necessary check for starting and shutdown.
- (c) Functional details of major components/Principle of operation.
- (d) Details of associated systems with schematics (v) Overall weight and weight of assemblies and sub-assemblies.
- (e) Seat machining requirements
- (f) List of special tools, facilities and equipment required to lift, transport and install the equipment.
- (g) Requirement of consumables like Greases, Oils etc., with their equivalents along with Chemical composition and Physical properties.
- (h) Information on Material specification, size, flow rate, capacity, pressure testing, Interface details etc. for the ships systems piping viz. Fuel Oil, Lube Oil, & Sea Water System.
- (i) Performance curves and design calculations
- (j) Desired clearances and wear limits of all wearing components
- (k) Maintenance requirements. All maintenance till the end of service life, including procedures to carry out such maintenance should be clearly specified. All mandatory replacement parts required for maintenance is to be indicated. Daily routines up to major overhaul, replacement of major assemblies/components and 'Fault Analysis'
- (l) Data on reliability parameters
- (m) Operation, maintenance, repairs and trouble shooting for levels up to second level maintenance. Component level maintenance procedures shall be offered as an option.
- (n) Part Identification List, indicating Part No., Quantity, Makers name, materials, etc.
- (o) Installation, alignment & setting to work procedures.
- (p) List of tally plates.
- (q) Test Data. Test and trial documentation covering installation checks, pressure test, vacuum test, cut-outs and set to work and load trials as applicable are to be provided by the manufacturer.
- (r) Any special instructions for installation, preservation, painting, storing, handling/lifting, etc.
- (s) Storage, preservation/re-preservation procedures and preservation Schedules including requirement of preservatives
- (t) Heat Dissipation.
- (u) Shock calculations as per Dynamic Design Analysis Method indicating shock capabilities.
- (v) Calculation for external loads & movements for lub oil flow & heat, for the equipment efficiencies at various load.
- (w) Complete details of SV mounts including Resilient mounting calculations



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- (x) Noise and Vibration data detailing the maximum expected noise and vibration levels on a frequency base.
 - (y) A table of reference, which includes drawing number of each major assembly.
 - (z) Torque value of bolts, which are to be tightened at site
 - (aa) Installation Specifications, Alignment values, pressure testing and flushing requirements of associated auxiliary systems indicating their tolerance limits for each and Commissioning procedures.
 - (bb) Requirement and Procedures for HATS/SATS.
 - (cc) Details of Integration of controls monitoring system and its integration with Integrated Control system
 - (dd) Factory Acceptance Test Plan and reports / certificates.
 - (ee) Certification of Shock grade 'A' for all components mounted on SV mounts & for equipment mounted directly on the Hull.

31. **Quality Assurance and Testing:** Quality assurance and testing requirements, pertaining to this equipment should confirm to Standard Conditions of Quality Assurance (SCQA) placed at **Annexure – 2**. A separate QAP will be required for valves.

32. **Design Standards:** Naval engineering standards/Defense standards (Def-Stan)/ (NES) published by Ministry of Defense, UK or equivalent naval standards for combatant vessels are to be followed as general design guidelines.

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

- (a) Design : Directorate of Naval Design of Indian Navy.
Detailed Design by Shipyard.
- (b) Construction : Shipyard (MDL & GRSE)
Warship Overseeing Team (WOT)/Indian Navy, at Shipyard.
- (c) Quality Control : DQA (WP)/ DQA (N) (for indigenous
Manufacturing items)
IACS Like LRS, GL, BV, ABS etc. (for imported items)
- (d) Ship Trials : MTAA /ETMA or any other organization
nominated by Indian Navy.

34. **Quality Assurance:** 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.

- (a) 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: 2008 (quality management systems) or its latest version.
- (b) During equipment production, any deviation to the QAP/finalized specifications/standards shall be brought to the notice of designated inspection organization and Shipyard/Indian Navy, along with valid reasons and recommended solution, without any compromise on quality, reliability and performance of the equipment.



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35. **Standards:** Where standard components are used, certificates should support the same.

36. **Quality Improvement Programme:** The supplier shall indicate major defects as well as user complaints for the equipment fitted on similar class of ships and the corrective action taken against them. The supplier shall also indicate the major improvements carried out in the latest version compared to the previous version.

37. **Harbour Acceptance Trials/ Sea Acceptance Trials:** Onboard trials shall be conducted by Shipyard based upon HATs/SATs documentation and ship's trials schedule, (GRAQ), which would be planned by shipyard in consultation of equipment suppliers/WOT/Trial organizations/Indian Navy. Draft HATs/SATs schedule in accordance to DME 303D is to be submitted by the firm for concurrence of IHQ of MoD(N).

- (a) During equipment setting to work and HATs/SATs, equipment suppliers shall assist and offer the respective equipment trials for successful completion of trials phase. Equipment testing, tuning and any defect rectification during onboard trials shall be undertaken by the equipment supplier in efficient and effective manner.
- (b) HATS/SATS documents shall include HATs/SATs schedule, procedure, prerequisites, 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.
- (c) Shipyard will prepare GRAQs (General Requirement of Acceptance of Quality), trial document, based on the HATs/SATs document submitted by the supplier. The same shall be forwarded to the supplier for their vetting.
- (d) HATs/SATs shall be carried out to the satisfaction of Naval agencies such as Machinery Trials Acceptance Authority (MTAA) and Electric Trials and Modification Agency (ETMA) as per approved **GRAQ**.
- (e) Noise and Vibration trials shall be conducted as desired by IHQ of MoD (N) /WOT (Warship Overseeing Team). Points for measurement of vibration limits shall be indicated by IHQ of MoD (N).
- (f) **GRAQs (General Requirement of Acceptance of Quality):** Supplier shall offer / assist HATs and SATs of respective equipment and attest the GRAQ forms on their successful completion.
- (g) The major/critical elements of the equipment shall be subject to inspections during the post CST (SATs) dry docking of the ship.

38. **Maintenance & Logistics:** Envisaged operational and maintenance cycle for Project-17A class of ships is indicated below:

- (a) Approximately 24 months operating cycle, followed by Short Refit (SR) of approximately 4 months duration. Every third SR would be Normal Refit (NR) of approx. 8 months duration. Every alternate NR would be Medium Refit (MR) of approximately 18 months duration.
- (b) Dry-docking interval would be at least 52 months/commensurate with refit cycle.

39. Equipment supplier shall ensure high reliability and low maintenance of equipment. While equipment maintenance and repair between major overhauls would be carried out insitu on-board the ship, major maintenance/overhaul would be undertaken ashore by repair organization. Equipment design should therefore ensure ease of maintenance and



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

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

41. Following shall be provided by the equipment supplier, with regard to maintenance and logistics requirements:

- (a) Onboard spares for 12 months operational cycle and base & depot spares.
- (b) Continued Acquisition and Lifecycle Support Strategy (CALs).
- (c) Reliability and maintainability plan.
- (d) Maintenance management system including maintenance concept and maintenance planning.
- (e) Physical configuration management plan.

42. **Spares:** Installation & Commissioning Consumables, 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/Indian Navy, based upon ranging and scaling by Indian Navy.

- (a) Documentation for equipment spares shall include Comprehensive Part List (CPL) & Part Identification List (PIL), for meeting Indian Navy's Integrated Logistics Management System (ILMS)/Ship's Logistics Management System (SLMS) requirements.

43. **Installation tools & Commissioning Consumables / Spares:**

- (a) **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.
- (b) **Commissioning Consumables/Spares:** 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. An itemized list with cost for the same is also to be indicated in the offer to facilitate their procurement in future, if required.
- (c) **Consumables for 2000 Hrs Exploitation:** Hourly routine schedule up to approx. 2000 hrs exploitation to be defined in the offer. The list of consumable & services required for the same with cost breakup to be given in the offer. The same shall be ordered as & when required.



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44. **On Board Spares (OBS):** The OBS and special tools shall cater for all on board maintenance routines and possible repair requirements. Preservation requirement of OBS, if any, shall be indicated in the offer. List of OBS required for auxiliary items also shall be indicated in the offer. The OBS shall be ordered along with the main equipment. However, they are to be delivered before STW of the main equipment, tentative schedule of which shall be indicated in the Tender Enquiry. An itemized list with cost (in ILMS format to be submitted in soft copy in excel) of On Board Spares (OBS), special tools and test equipment is to be provided in the offer and should include the following (but not limited to):

LIST OF OBS AND TOOLS FOR EXHAUST AND IRSS FOR 1 YEAR [PER SHIPSET]			
S No.	DESCRIPTION	QTY	UNIT
1	Instrumentation Assembly: Exhaust back Pressure Sensor	1	Nos
2	Thrust Washer	1	Set
3	Gasket /O Ring	1	Set

45. **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. 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. 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.

- (a) Two separate itemized list with cost (in ILMS format to be submitted in soft copy in excel) of B&D spares, one for 4 ships of MDL and the other for 3 ships of GRSE, are to be recommended and provided in the offer. An indicative list of B&D spares (but not limited to) is given below:

Table 6

LIST OF B&D SPARES FOR EXHAUST AND IRSS SYSTEM FOR MDL [4 SHIPSETS]			
SI	DESCRIPTION	QTY	UNIT
i.	Compensator	1	No.
ii.	Hull flap (Valve) & Regulating flap (Valve) assembly	1	No.
iii.	Special High Temperature Gasket	8	Nos.
iv.	Flexible supporting assembly	1	No.
v.	Instrumentation Assembly: Pressure Sensor	1	No.
vi.	Instrumentation Assembly: Temperature Sensor	1	No.
vii.	Water Injection Nozzle	1	No.
viii.	Flexible hoses for IRSS Device	4	Nos.
ix.	Bearing	2	Nos.
x.	Bearing Sleeve	2	Nos.
xi.	Thrust Washer	2	Sets
xii.	Gasket /O Ring	2	Sets
xiii.	Impeller	1	No.



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Table 7

LIST OF B&D SPARES FOR EXHAUST AND IRSS SYSTEM FOR GRSE [3 SHIPSETS]			
SI	DESCRIPTION	QTY	UNIT
i.	Compensator	1	No.
ii.	Hull flap (Valve) & Regulating flap (Valve) assembly	1	No.
iii.	Special High Temperature Gasket	6	Nos.
iv.	Flexible supporting assembly	1	No
v.	Instrumentation Assembly: Pressure Sensor	1	No.
vi.	Instrumentation Assembly: Temperature Sensor	1	No.
vii.	Water Injection Nozzle	1	No.
viii.	Flexible hoses for IRSS Device	3	Nos.
ix.	Bearing	2	Nos.
x.	Bearing Sleeve	2	Nos.
xi.	Thrust Washer	2	Sets
xii.	Gasket / O Ring	2	Sets
xiii.	Impeller	1	No.

(b) The B & D Spares shall be ordered at a later date, after ranging and scaling of the Spares done by IHQ of MoD (N). 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.

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

47. **Interfacing Obligations:** The equipment supplier shall essentially provide all data and information required for seamless integration of the equipment with other propulsion equipment, ship's structure and shipboard systems (including IPMS) in standard internationally accepted protocols (non-proprietary). Non-compliance to the same will be treated as breach of contractual commitment. Equipment design shall be compatible for meeting the envisaged functional performance as integral part of the propulsion system in holistic manner.

(a) In case of any discrepancy, deficiency, failure, etc., related to the scope of supply, the GRSE/Indian Navy or any agency designated by GRSE/Indian Navy will be entitled to investigate the subject matter and the equipment supplier would be bound to take corrective actions, as necessary, for fulfilling the contractual specifications & requirements.

48. **Space Constraints:** While designing the equipment and its associated auxiliaries / components the supplier is required to take into consideration the space availability in the respective compartments of the ship, ease of operation/maintenance of the equipment onboard the ship, ergonomics aspects and safety. Maintenance envelopes for equipment and its auxiliaries/components shall be provided by the equipment supplier and assessed in consultation with the GRSE/Indian Navy for finalizing the layout of respective ship compartments. Optimization in design is to be ensured while meeting the functional, maintainability and ergonomic requirements.



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49. **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, without affecting the specified equipment performance.

50. **IRSS Requirements:** The uptakes shall be fitted with an Infra-Red Suppression Signature (IRSS) device. The pressure drop due to such device shall be as low as possible and total uptake pressure drop should not exceed the permissible limits, under any operating conditions.

51. **NBC Requirements:**

- (a) All machinery equipment shall be designed and constructed to avoid any leaks of fluids and materials possibly contaminated by NBC agents. In this condition, the inside enclosure temperature may reach a maximum of 70°C (hottest points).
- (b) The machinery rooms protection zones are configured so that a controlled flow of air will be drawn from the citadels and supplied to each machinery space to ensure an over pressure of 30 mm WG. For control rooms/compartments which would be part of citadels, an over pressure of 25 mm WG would be ensured. In this condition, the room temperature may reach a maximum of 55°C (hottest points).

52. Tally and Diagram Plates: All major components, including fittings such as valves, cocks, flaps, pumps, motors, panels, 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 anodized aluminum alloy. 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 **NES-723 specifications**.

- (a) Arrow marking for direction of rotation of motor shall be provided by supplier. This tally shall be made of Naval Brass and properly secured on the motor.
- (b) Motor details such as HP (kW), Starting Current, Full Load Current, rpm, Insulation, Weight, Maker's Name, Sr. No. of Machine, Year of Manufacturing etc. shall be given in the motor tally plate.
- (c) Motor winding terminals ending at Connection Box shall have engraved tally number as per the anodized aluminum tally affixed at the rear side of motor connection box.
- (d) The diagram plate, which is fixed on the rear side of the front door of IRSS Panel, shall have complete wiring diagram of the starter with sub-component identification number. The same identification number shall be engraved on the components fitted on the starter.
- (e) Internal Cable-Cores terminating at the connection terminal strip shall have the same corresponding terminal ferrule no. Fixed / fitted on it.

53. 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 anodized (anodized aluminum alloy). Equipment is to be supplied with a set of instruction plates duly mounted on equipment or supplied loose.



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54. **Painting:** Standard painting procedure shall be applicable for suitability for marine environment and combatant ships. Equipment shall be cleaned, degreased and painted with two coats of anticorrosive marine paint & two finish coats. All equipment painting shall conform to DGS 251/NES 1005.

55. **Lifting Arrangement:** Equipment components weighing more than 40 kilograms are to be provided with eyebolts, 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. The necessary lifting arrangement of exhaust system with IRSS device to be provided for major overhaul of various equipments associated with DA.

To facilitate routine inspection and removal of mountings, fixed & flexible supports, permanent jacking or lifting devices is to be incorporated such that all mountings can be removed at the same time. The jacking or lifting devices are to be fitted with locking arrangements to ensure that in the locked clear position the correct shock clearance is maintained. One set of lifting gear shall be supplied to both shipyards MDL & GRSE.

56. **Preservation / Conditioning:**

- (a) 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.
- (b) 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 are to be provided on all openings.

57. **Packing & Shipping:** All equipment shall be adequately packed (seaworthy packaging in heavy-duty crate) 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.

58. **List of deliverables:** The OEM is to submit, along with the offer, the list of all deliverables, indicating Main equipment fitted with their standard parts/proposed loose installation items/ accessories/ OBS/ Tools/ Documents/ Commissioning spares, etc. in tabulated form (Soft Copy in EXCEL for the spare management part) in the following format for "Deliverables" :

Table 8

Sl. No	OEM Part no.	Code No. (will be filled up by GRSE)	Description (Indicating status i.e. assembled /loose etc.)	Unit	Qty	Remarks



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59. **Training:** The equipment supplier is to impart training, to ship's crew, training & shore maintenance organization; on aspects related to operation, installation, maintenance and repair of the equipment, along with Tools and Test Kit to be offered. 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. **Training plan will be submitted by the equipment supplier, along with the technical offer.** Training is required to cover the following aspects (but not limited to):

(a) **Training for Ship's Crew & Training Organization Personnel:**

- (i) Design and installation
- (ii) Operation and trouble shooting
- (iii) Control & monitoring
- (iv) Upkeep and routine maintenance
- (v) First & second level on board maintenance.

(b) **Training for Repair Organization Personnel:**

- (i) Design and installation
- (ii) Operation and trouble shooting
- (iii) Control & monitoring
- (iv) Third level maintenance, including major repairs and overhaul.

(c) For the majority of the personnel, training would be conducted by the equipment supplier at Shipyard, in consultation with Shipyard/Indian Navy. For training at equipment supplier facilities, around 10 personnel would be imparted training, the participants shall make their own arrangement for traveling and boarding for such training.

60. **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 Navy. Adequate measures are to be taken to ensure safe custody of this document.

61. **Warranty:** The equipment along with associated auxiliaries/components shall be warranted by the equipment supplier for the stipulated performance for a period of forty eight (48) months from the date of delivery of equipment to MDL & GRSE:

(a) The Equipment supplied shall be warranted against damage or failure or malfunction or under performance due to defects in design, material and/or poor workmanship or inappropriate material and non-conformance to specifications during the said period. Should such damage or failure or malfunction or under performance occur within that period, the supplier shall replace or repair such defective parts so as to achieve the stipulated performance. All expenses on account of such repair/replacement of parts against warranty defects shall be borne by the supplier.

(b) **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.

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



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

(b) The supplier shall have to submit, reasons for variation between allocated weight and actual/certified weight for each and every item, wherever applicable, to IHQ of MoD (N) and MDL for their consideration and further necessary action. The supplier shall endeavor to estimate the weight of the equipment/item very precisely so as to restrict the variation in weight to a maximum of 1%. In case, during production, if supplier anticipates the increase in weight by more than 1% then they should immediately inform to GRSE about the same so that its implications on the ship's performance and other related matters could be examined jointly by GRSE, IHQ of MoD (N) and Shipyards and appropriate timely corrective actions could be taken.

63. **Technical Assistance:** The Supplier shall provide the necessary representative(s) to assist, **as and when required**, in carrying out inspection and supervise the work that is done on the equipment during any, some or all of the following phases:

- (i) Preparation for installation of equipment by shipyard.
- (ii) Monitoring of proper equipment preservation during storage.
- (iii) On-board erection and alignment.
- (iv) Setting to Work
- (v) Harbour Trials.
- (vi) Assistance in trouble shooting.
- (vii) Customer Sea Trials.
- (viii) Post CST equipment Inspections
- (ix) Final Machinery Trials.

(a) The supplier shall indicate total cost for executing all technical assistance activities mentioned above, in the price bid.

(b) Shipyard has to progress on ship construction activities, simultaneously on ships of the same Class/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 service engineer / specialists for required technical assistance, on the required ships. Rotation of supervisors/specialist amongst the various ships/projects shall be avoided.

64. **References list:** A reference list of same/similar equipment, supplied for Naval Ships worldwide, is to be submitted by the equipment supplier with relevant details, along with the technical offer.

65. **Compliance Matrix:** Para-wise compliance matrix, including paragraphs 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 following format (preferably in excel sheet):



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Table 9

S No.	Tender Specifications Para reference	Brief Description as per Relevant Tender Specifications	Compliance to Tender Specifications	Deviations if any, with Reasons	Remarks if any



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Annexure – 1

SAMPLE MASTER QAP

MASTER QUALITY ASSURANCE PLAN



MQAP No. DGQA/DQA (WP)/004/2008/Rev 0

Name of Family of Equipment: **DIESEL ENGINE**

Prepared & Approved By: **DQA (WP)**

Scope: A comprehensive 'Reference' document for formulation / vetting of 'Quality Assurance Plan' (QAP) for the family of similar equipment. The document is prepared in two parts as under:-

- Part – I:** Contains check-off list of generic information that must be indicated on the first page of each QAP as its unique identity.
- Part – II:** Contains comprehensive list of inspections and/or trials stage wise that could be applicable for quality assurance of the equipment as laid down in SOTRs and 'Approved Drawings'. The inspections/trials must be contemporary to latest technology/techniques available in the industry at the time of placement of orders.

Total Nos. of Pages: **11**



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MQAP No. DGQA/DQA (WP)/004/2008/Rev 0

RECORD OF AMENDMENTS

<u>Sl. No.</u>	<u>Date of Amendment</u>	<u>Amendments</u>	<u>Authority</u>	<u>Remarks</u>





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MQAP No. DGQA/DQA (WP)/004/2008/Rev 0

Part – I: General Information

0101. The following generic information must generally be indicated on each QAP as its identity:-

- (a) Equipment Name
- (b) Equipment Technical Details (as applicable)
- (c) Purchase Order Reference
- (d) Sub/Sub-Sub Orders reference (as applicable)
- (e) Name of Main Indenter/ Ordering Authority
- (f) Name of end user
- (g) Name of Firm / Manufacturer
- (h) SOTRs Reference
- (i) Yard No./ Name of Ship where to be fitted (if available)/End User
- (j) References of relevant Drawings
- (k) QAP No. & Date (as indicated by the firm)
- (l) Contractual Delivery Date
- (m) Inspection Authority
- (n) Inspection Officer
- (o) Quantity (as applicable)





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Part – II: Technical Inspections / Trials

0102. This part of QAP will generally consist of three sections as given below:-

- (a) **Section – I:** Material Inspections for all main/sub assemblies/components.
- (b) **Section – II:** In-Process Inspections stage wise.
- (c) **Section – III:** Final Trials including 'Type Tests' as applicable and Inspections including verification & recording of weights, marking, preservation, packaging etc.

0103. The technical section would normally be in a tabulated format with following columns:-

- (a) Sl. No.
- (b) Component details
- (c) Characteristics / Type of Checks – **list of all applicable checks for that family of equipment.**
- (d) Quantum of check – Sample/100% etc.
- (e) Class of check – critical/major/minor etc.
- (f) Reference Documents / Acceptance standards – for each check as applicable.
- (g) Format/ Type of Record – CHP/Firm's QA Report etc.
- (h) Remarks (Inspection details i.e. P – Perform, W – Witness, V/R – Verification / Review, CHP – Customer Hold Point etc.

0104. Any additional information as 'Note' may also be included in each section for amplification of requisite tests/trials.





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MASTER QUALITY ASSURANCE PLAN FOR DIESEL ENGINE										
Part-I	Details as per Para 0101									
Part-II	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks	
Stage / Sl. No.								P	W	V
1	Material Inspections									
1.1	Lub oil cooler				Approved Drawing					
(a)	Tube-CuNi 70:30	(i)Chemical/Physical	One/heat		Approved Drawing					
		(ii)Eddy current test	100%							
(b)	Shell	Chemical/Physical test	One/heat		Approved Drawing					
(c)	Tube Plate- Naval brass	Chemical/Physical test	One/heat		Naval Brass BS-2875CZ11 2 / SB 171 C 46400					
(d)	End cover	(i)Pouring witness	100%		BS 1400 LG 4					
		(ii)Physical/Chemical test	One/heat		BS 1400 LG 4					
		(iii)Ultrasonic/Radiography	100%		BS 1400 LG 4					
		(iv)Pressure test-(test press=1.5WP)WP- Water side-3 bar, lub oil-10 bar)	100%		BS 1400 LG 4					





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Stage/ SI. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks	
1.2	Cylinder Liners Material - Cast Iron (Lamellar Pearlitic)	(i) Pouring witness	100%		Approved Drawing					
		(ii) Chemical/Physical test	Each per heat		Approved Drawing					
		(iii) Pressure test-(test pressure =1.5WP or 4 bar whichever is more)	100%							
		(iv) Dimension	100%							
		(v) Ultrasonic test	100%			Approved Drawing				
1.3	Transmission Coupling									
(a)	Inner Star	(i) Chemical/Physical test	Sample per heat	Approved Drawing						
(b)	Outer Ring	(i) Chemical/Physical test	1 Sample per heat	Approved Drawing						
1.4	Heat Exchanger (fresh water / sea water)	(ii) Dimensional	100%							
		(iii) Balancing	100%		Grade 6.3 as per ISO 1940 Approved Drawing					
		(i) Chemical/Physical	Sample per heat		Approved Drawing					
		(ii) Eddy current test	100%		Approved Drawing					
(b)	Shell-Steel	Chemical/Physical	One sample/heat		SA 516 Gr.70					
(c)	Header Plate-Naval brass	Chemical/Physical	One sample/heat		Naval Brass BS-2875CZ11 2 / SB 171 C 46400					
(d)	End cover	(i) Pouring witness	100%		BS 1400 LG 4					



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Stage / Sl. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks
		(ii) Physical/Chemical test	One sample/heat						
		(iii) Ultrasonic/Radiography	100%						
		(iv) Pressure test- (press. test ≥ 1.5 WP) (WP-Fresh Water- 4 bar) Sea Water- 3 bar)	100%						
1.5	Air Receiver	(i) Chemical/Physical	Sample per heat		Approved Drawing	Approved Drawing			
		(ii) Pressure test- (press. test ≥ 1.5 WP) WP-30 bar	100%						
1.5	Valve head Body	(i) Chemical/Physical	Sample per heat		Approved Drawing				
		(ii) Pressure test- (press. test ≥ 1.5 WP) WP-30 bar	100%						
1.7	Exhaust silencer with spark arrester	(i) Chemical	Sample per heat		Approved Drawing				
		(ii) Visual	100%						
		(iii) Dimensional	Major						
		(iv) DP test on weld joints	100%						
1.8	Local control panel	Functional check / simulation test	100%		Approved Drawing				
1.9	Clutch control panel	Functional check / simulation test	100%		Approved Drawing				
1.1.1	Sensor Panel	Functional check / simulation test	100%		Approved Drawing				
1.1.2	Clutch air supply panel	Functional check / simulation test	100%		Approved Drawing				
1.1.3	Water pump Body	(i) Pouring witness	100%		Approved Drawing				



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An ISO 9001-2015 Plant

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Phone: 2446134/2401428/2446360/2401548, Fax: + (91) 0651-2446895

MQAP No. DGQA/DQA(WP)/004/2008/Rev 0

8

Stage / Sl. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks
		(i) Chemical/Physical (ii) Pressure test- (press. test: 1.5WP) WP- 4 bar (iv) DP test	Sample per heat 100%						
1.1.4	Starting Air Pipe Material - Class 4.6 MS (Mild Steel)	(i) Chemical/Physical (ii) Visual (iii) DP Test on weld joint (iv) Pressure test- (press. test: 1.5WP) WP- 30 bar	Sample per heat 100%		Approved Drawing				
1.1.5	Lub oil pump Body	(i) Pouring witness (ii) Chemical/Physical (iii) Pressure test- (press. test: 1.5WP) WP- 10 bar (iv) DP test	Sample per heat 100%		Approved Drawing				
1.1.6	Crank case with Cylinder Liners	(i) Pressure test- (press. test: 1.5WP) WP- 4 bar (ii) DP test	Sample per heat 100%		Approved Drawing				
1.1.7	Cylinder Head	(i) Pouring witness (ii) Physical/Chemical test (iii) Pressure test- (press. test: 1.5WP) WP- 4 bar (iv) DP test	Sample per heat 100%		Approved Drawing				





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Stage / Sl. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Typ e Method of Check	Reference Documents	Accepta nce Norms	Format of Record	Agency	Remarks
1.1.8	Cylinder head safety valve	(i)Calibration pressure 185 bar	100%		Approved Drawing				
2	Stage Inspections								
2.1	Gear	(i)Chemical (ii)Dimensional (iii)Visual	Sample per heat 100%		Approved Drawing				
2.2	Lub oil priming pump	(i)Pump-Performance Test (ii)Motor-Routine Test	100%		Approved Drawing	Rated capacity			
3	Final Inspections / Trials								
3.1	Engine performance test	(i)Engine performance parameters (ii)Vibration	100%	(i)Coupled to hydraulic dynamom eter & test bed setup and fuel as per SOTR	Technical specification of P.O		Test report format as per SOTR		(i) Measuring of all engine parameters including fuel consumption is to be carried out during engine performance test to establish performance characteristic of engine (ii) No. of starts to be demonstrated as per SOTR -12 with single firing of air receiver (ii)Noise and vibration readings will be recorded at 100% maximum continuous rating (MCR) or as required by SOTR





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Stage / Sl. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks
		(iii) Noise level	100%	(i) Sound level in cylinder head level at 01 meter away	Technical specification of P.O				
3.2	Operation of safety devices	Test bed safety devices to be demonstrated	Internal inspection report of mfr	Simulation of safety conditions	Drawings		Review of report		
3.3	Inspection of parts after the test	Condition of following items to be checked (i) Cylinder (ii) Con rod big end bearings (iii) Piston (iv) Main bearing (v) Cylinder head assembly	One cylinder to be opened	Visual Inspection					(i) Engine to be run for one hour after re-assembly (ii) Lub oil sample to be collected for analysis
3.4	Engine		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O
3.5	Auxiliaries		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O
3.6	Spare parts		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O
3.7	Tools		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O





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Stage / Sl. No.	Materials / Components as per SOTR	Characteristic / Type of Check	Quantum of Check	Class/Type of Method of Check	Reference Documents	Acceptance Norms	Format of Record	Agency	Remarks
3.8	Documentation as per P.O		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O
3.9	Packing & Preservation		100%	Visual Inspection	Purchase order & packing sheet				List as per P.O
	Notes : As required								





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Annexure – 2

STANDARD CONDITIONS FOR QUALITY ASSURANCE FOR NAVAL SHIPS (SCQA)

Preamble

1. The equipment/items being supplied under this enquiry/order are required to pass through Quality Assurance norms/inspections in accordance with the Guidelines for Quality Assurance for Engineering and Hull equipment for Indian Naval Warships and the various Master Quality Assurance Plans for Naval Orders (uploaded at <http://www.dgqadefence.gov.in>)
2. The vendor, at any point from receipt of RFP/TE, may seek clarifications on QA related aspects from the concerned Quality Assurance Establishment (QAE) or the Inspecting Authority (Directorate of Quality Assurance (Warship Project) DQA (WP)/Directorate of Quality Assurance (Naval) (DQA (N)), if required. Contact details of various QA agencies are available at DGQA website (<http://www.dgqadefence.gov.in>).
3. The nominated inspection agency (QAE) will undertake inspection/tests in accordance with the Quality Assurance Plan (QAP) approved and issued by the Inspection Authority (DQA (WP)/DQA(N)), unique to the PO. Salient aspects covering QAP and inspection are enumerated in succeeding paragraphs.

Drawing up and Approval of QAP

4. Quality assurance Plan for each PO will be drafted by the manufacturer. Following documents (uploaded at <http://www.dgqadefence.gov.in>) may be referred for drafting the QAP (The documents under reference are to be taken for guidance only and the various tests and other requirements of quality assurance will be governed by the Quality Assurance Plan as approved by the Inspecting Authority based on SOTR/Purchase Technical Specification/TNC Minutes and criticality of the equipment.):

- (a) Guidelines for Quality Assurance for Engineering and Hull equipment for Indian Naval Warships
- (b) Various Master Quality Assurance Plans
- (c) QAPs issued previously

5. The QAP should cover all components, sub assemblies and full assembly including motors control panels, consoles etc. and the draft QAP is to be submitted to the local QAO for final approval by the Inspecting Authority. Each page of the draft QAP is to be endorsed by the vendor prior submission to the local CQAO/QAO.

6 Since the QAP flows from the SOTR and drawings therein, draft QAP shall be submitted along with approved drawings. The drawings are to be duly approved as per extant procedures prior submission of draft QAPs.

Requirements on Drawings

7. The drawings are to have all details as necessitated by the SOTR to enable drawing out a comprehensive and all inclusive QAP to ensure the compliance of the requirements of the SOTR.

8. The drawings should be submitted as a complete set with GA drawing and Manufacturing drawings (sub assembly/component drawings, Component Layout Drawing, Wiring chart, cable schedule, Connector details etc.) with both mutually identified and duly linked with one another.



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9. The drawing should include (may not be limited to) the following:

- (a) Dimensions and units
- (b) Tolerances
- (c) Main Assembly/ Sub Assembly details
- (d) Bill of Materials/Part Identification List (PIL) along with Material Specifications including grade, condition and specification number, "Make" in case of COTs items.
- (e) For Sub Component Drawings, correlation details with the PIL & Main Assembly Drawing
- (f) Packaging & Preservation details
- (g) Weight with tolerance
- (h) Working/Test Pressures and working medium/testing medium.
- (j) Applicable Specification Number (along with the No of Version and Year of Publication)
- (k) Product specific testing requirements.
- (l) NDT zones and Qualify level of NDT
- (m) ET/ESS and Type test requirements
- (n) Weld details and acceptance norms thereof.
- (p) Manufacturing process for major components

10. Drawings should also clearly indicate items/components/sub assemblies that are imported, brought out & COTS along with full details thereon. This should include the source of procurement/import the model and the make of the bought out/COTS items. In case of electronic modules fabricated/assembled indigenously with imported/brought out components, requisite information to ensure quality and traceability is to be provided.

11. The drawings and QAP should clearly indicate the standards governing all tests and specifications as with respect to material, test procedures etc.

Inspections

12. Inspection could include following:

- (a) Raw material inspections which may include witnessing of pouring, forging etc.
- (b) Destructive tests of samples for chemical composition/mechanical properties.
- (c) Component level (including weldments) Non Destructive Tests (NDT) like RT, UT, DPT, MPT etc. to detect surface/sub surface defects and grain boundary discontinuities.
- (d) Micro/Macro examinations as required.
- (e) Dimensional checks before assembly.
- (f) Sub equipment/component level pressure testing in addition to NDT for integrity/strength conformity.
- (g) Witnessing procedures to ensure compliance to manufacturing plan and traceability of the component.
- (h) Inspection/verification of calibration status of measuring instruments/ machinery/other instruments including furnaces/lathes/boring centers etc for Heat treatment/melting/machining etc.
- (j) Qualification test like type tests and Environmental Testing (ET), Environmental Stress Screening (ESS), and EMI/EMC tests. Samples of ET and ESS plans are placed at **Table A and B** respectively. The EMI/EMC tests, will be carried out as per IHQ MoD (N) approved Naval EMI/EMC acceptance Plan (EMI-AP) duly vetted by NEC (MB).
- (k) Clearance of Customer Hold Points (CHPs) by the nominated inspection Agency prior proceeding further with manufacturing, (both for "witness" and "review" as per applicability) to obviate rejection at later stage.
- (m) Details of mode of preservation, duration of preservation, marking, packaging and dispatch procedures are to be provided unambiguously.



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13. Further all tests are to be undertaken at. NABL accredited laboratory. Under intimation to the concerned QAO. Inspecting Authority/QAO reserve the right to nominate a specific laboratory/organization to undertake the tests.

Imported/COTs/Catalogue/Bought Out Items

14. Imported items will be accepted against following import documents as per current directives:

- (a) Bill of Lading
- (b) Country of Origin
- (c) Shipping Bill
- (d) Bill for entry to warehousing
- (e) OEM's Test Certificate/Quality Assurance Guarantee Certificate
- (f) PAC firm's Confirmation Certificate
- (g) Firm's Guarantee Certificate as per SOs. Functional tests may be undertaken, if required, in addition.

15. COTS items cover only those items/equipments which are available in the open market and are under the regular production of the firm and can be procured off the shelf by main firm/vendor without having to give a specific manufacturing order. The Suppliers Test Certificate (STC) is required to be submitted if specified in QAP.

16. COTS/Catalogue items may be accepted on the basis of Certificate of Conformity (CoC) with following conditions:

- (i) Certificate of Conformity (CoC) must indicate governing specifications and values to which the item has been tested. The certificate must include copies of test reports.
- (ii) In case of manufacturers certified under relevant quality standards (like ISO, Ojhas etc), the pre published data sheet or company quality policy bringing out the details of test carried out on specific items may be accepted.
- (iii) Indian Navy reserve the right to Test a sample out of that supplied, for conformity to desired specification. Failure of the test sample will make the supplier liable for rejection/return of the entire lot with penal implications . The test may be undertaken by IN anytime during the guarantee period at an accredited lab.

17. Bought out items are those which are in the regular production range of the manufacturing firm / sub vendor and manufactured on placement of specified order by main firm and production is covered by main firm's quality control programmer. The requirement to subject bought out item through inspection will be as per MQAP/approved QAP.

Dual Inspection Equipments/items

18. In case of equipment covered under dual inspections by Class and DQA(WP)/DQA(N), QA coverage according to approved QAP by DQA(WP)/DQA(N) is mandatory.

19. Inspection note from QAO will be mandatory for equipment and will be issued post completion of all inspection stages as per DQA(WP)/DQA(N) approved QAP.

20. The vendor may associate the Class whilst QAO is undertaking inspection for economy of efforts.



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Validity of the QAP

21. An approved QAP is valid only for the specific purchase order for which it is issued.
22. Whilst existing QAP for same/similar equipment/item supplied earlier can be taken for guidance, any changes required in terms of addition/deletion of tests or modifications that has been necessitated view lessons learned and/or technological advancements needs to be verified and confirmed from the inspecting authority prior undertaking any manufacturing activity.
23. In case of equipment/spares which were earlier procured and inspected by QAP approved by third party (e.g. IRS etc.), the QAP will be required to be reapproved as per current procedure.
24. Available QAP for the same/similar equipment/item approved earlier, can be used for the current order after confirming its applicability from the Inspecting Authority. The inspecting Authority will confirm acceptance or otherwise within seven working days of receipt of the request in writing.

Other Conditions

25. The vendor is to contact the inspecting agency within five working days of the receipt of purchase order to initiate quality assurance plans. A copy of minutes of this meeting is to be forwarded to the Order Placing Agency, Inspecting Authority and Inspection Agency clearly mentioning the timelines for submission of various document to be submitted by the vendor.
26. The First Contact Letter (FCL) from respective CQAE/QAE to vendor will be issued immediately on receipt of purchase order from order placing authority. The vendor is to follow the requirements mentioned in FCL, and the vendor may) seek all clarifications from the Inspecting Agency at the earliest.
27. Manufacturing is to commence only after the QAP has been approved and issued by the Inspecting Authority.
28. Details of previous orders and available drawings/QAPs for same/similar equipment supplied by the firm earlier are to be provided along with draft QAP. In case any changes are envisaged to the existing QAP, the same are to be clearly indicated. This will facilitate easier and quicker approval of QAP.

Sub-Assemblies and Spares

29. All electrical equipments (eg for motor, starter etc.) are to be sourced only from the current Navy approved vendors & promulgated by IHQ MoD (N)/DEE in compendium of vendors.
30. If sub-assemblies are ordered on sub vendors, it will call for separate drawing and QAP approval for inspection by DQA units.
31. Spares will also be governed by their specific QAPs. However, spares supplied by OEM/PAC firms may be inspected and cleared on the basis of sketches/drawings/description given in PIL approved by the professional directorate.



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Table- A

(Refer, Para 12(j))

1. Thermal Shock (Component Level)

- a. Temperature Range : -40° C to +85° C
- b. Change over time : <3 Min
- c. No. of cycles : 08
- d. Dwell time : 20 Min or full stabilization

2. Thermal Cycling.

(a)

Characteristic	Level and Assembly		
	PCB level	Unit level	System level
Temperature range	-50° C to +75° C To -65° C to +100° C	-40° C to +70° C To -55° C to +85° C	40° C to +60° C To 55° C to t70° C
Temperature rate of change	10°C /min To 20°C /min	5°C /min To 20°C /min	5°C /min To 10°C /min
Soak time	Long enough to perform functional testing after temperature stabilization.		
Equipment Monitored	No	Yes Monitored	Yes Monitored

(b) No. of cycles. 10 min

3. Random Vibration. PCBs are to be mounted on dummy card cage which is to be secured to vibration platform screen parameters as follows:

Screen type parameter and conditions	PCB level	Equipment level
Random Vibration		
Acceleration level	6 Grms	6 Grms
Frequency limits	20-2000 Hz	20-2000 Hz
No. of Axis	03	03
Duration	10 mins/axis	10 mins/axis
Power ON/OFF	OFF	ON
Equipment monitoring	No	Go / No go Performance Monitoring.



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Table- B

(Refer, Para 12(j))

ENVIRONMENTAL TEST SPECIFICATIONS

1. Indigenously Manufactured Equipment. Electrical/Electronic equipment should comply with following environmental test specifications to be conducted in accordance with JSS 5555:2012. Confirmation of compliance to Environmental specifications would involve conduct of physical tests on the first production system.

Sr.No.	Test	Test No.	Specifications	Remarks																		
a)	High Temperature	17	Procedure 6. Test Condition K: (a) Operation at +55°C (b) Storage at +70°C																			
b)	Low Temperature	20	Procedure 4. Test Condition H: at -10°C																			
c)	Vibration	28	Equipment Installed in Major Warships (I) Mast head region <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Frequency range</th> <th>Amplitude</th> </tr> </thead> <tbody> <tr> <td>5 to 14 Hz</td> <td>±1.25 mm constant displacement</td> </tr> <tr> <td>14 to 23 Hz</td> <td>±0.45 mm constant displacement</td> </tr> <tr> <td>23 to 33 Hz</td> <td>±0.125 mm constant displacement</td> </tr> <tr> <td colspan="2">(ii) After region</td> </tr> <tr> <td>5 to 23 Hz</td> <td>±0.45 mm constant displacement</td> </tr> <tr> <td>23 to 33 Hz</td> <td>±0.125 mm constant displacement</td> </tr> <tr> <td colspan="2">(iii) Main region</td> </tr> <tr> <td>5 to 33 Hz</td> <td>±0.125 mm constant displacement</td> </tr> </tbody> </table>	Frequency range	Amplitude	5 to 14 Hz	±1.25 mm constant displacement	14 to 23 Hz	±0.45 mm constant displacement	23 to 33 Hz	±0.125 mm constant displacement	(ii) After region		5 to 23 Hz	±0.45 mm constant displacement	23 to 33 Hz	±0.125 mm constant displacement	(iii) Main region		5 to 33 Hz	±0.125 mm constant displacement	The equipment should be in switched ON condition during the Test. The equipment would be mounted on the vibration table by its normal means of attachment on ship.
Frequency range	Amplitude																					
5 to 14 Hz	±1.25 mm constant displacement																					
14 to 23 Hz	±0.45 mm constant displacement																					
23 to 33 Hz	±0.125 mm constant displacement																					
(ii) After region																						
5 to 23 Hz	±0.45 mm constant displacement																					
23 to 33 Hz	±0.125 mm constant displacement																					
(iii) Main region																						
5 to 33 Hz	±0.125 mm constant displacement																					
d)	Mould growth	21	Temperature 30°C, RH greater than 90%	Separate equipment can be used for this Test. conducted samples.																		
e)	Corrosion Salt	9	Temp 35' C and RH 90 to 95 % For Exposed items - Procedure 1 For Protected items- Procedure 2	Separate equipment can be used for this test. To be conducted on representative samples.																		



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f)	Driving Rain	12	Test Condition C	For exposed items
g)	Damp Heat	10	The temperature and relative humidity 40°C at 95% RH	
h)	Tropical Exposure	27	Test condition A — 7 cycles (Protected) Test condition C — 28 cycles (Exposed)	
j)	Drip Proof	11		For protected items
k)	Solar Radiation	25	Irradiance of 1.2 + 0.10 KAM2 Procedure 1	For exposed items
l)	Shock or Impact	24	(a) NSS Grade I (for equipment fitted below waterline) - 120g, 8ms (vertical) and 70g, 8ms (lateral). (b) NSS Grade II (for equipment fitted above waterline) - 50g, 11 ms (vertical) and 22g, 8ms (lateral).	The equipment should be in switched OFF condition during the test.
m)	Bump	5	Peak acceleration 100 m/s ² , pulse duration 16ms, No. of Bumps 4000±10, general ruggedness test.	



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Annexure – 3

WEIGHT CONTROL DATA SHEET						
EQUIPMENT DESCRIPTION		EQUIPMENT NO.				
COMPARTMENT		LOCATION				
SWBD :						
TOLERANCE CODE	PRELIMINARY EST.	DESIGN EST.	M.T.O (CALC)	WEIGHT	TOLERANCE ± %	
1. WEIGHT (Kg.)						
(a)	DRY	Kg +	%			
(b)	FLUID	Kg +	%			
(c)	OPERATING	Kg +	%			
(d)	TEST	Kg +	%			
(e)	TOTAL	Kg +	%			
2. EQUIPMENT DIMENSIONAL DATA (mm) & Co-ordinates of CoG						
<div style="text-align: center;"> <p>'A'</p> <p>'X'</p> <p>'Y' C.G.</p> <p>'B' .</p> <p><u>PLAN</u></p> <p>'A'</p> <p>'X'</p> <p>'Z' C.G.</p> <p>'C' .</p> <p>ELEVATION</p> </div>	<div style="text-align: center;"> <p>'B'</p> <p>'Y' C.G.</p> <p>'B' .</p> <p><u>PLAN</u></p> <p>'C'</p> <p>'Z' C.G.</p> <p>'C' .</p> <p>ELEVATION</p> </div>	<div style="text-align: center;"> <p>'A'</p> <p>'X'</p> <p>'Y' C.G.</p> <p>'B' .</p> <p><u>PLAN</u></p> <p>'C'</p> <p>'Z' C.G.</p> <p>'C' .</p> <p>ELEVATION</p> </div>				
NOTE : <ul style="list-style-type: none"> ALL OFFERS SHALL INCLUDE THIS DATA SHEET DULY FILLED IN BY THE SUPPLIER (SIGNED, DATED & SEAL AFFIXED). ALL FINISHED ITEMS SHALL BE WEIGHED & A CERTIFICATE SHALL BE PROVIDED AS PER ATTACHED SHEET. SEPARATE SHEETS SHALL BE COMPLETED FOR EACH INSTALLED EQUIPMENT. ORIGIN OF 'X', 'Y' AND 'Z' TO BE INDICIATED. 						
SUPPLIER'S SEAL			SUPPLIER'S SIGNATURE & DATE			



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Annexure – 4

<i>WEIGHT CERTIFICATE</i>			
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 style="width: 100%; height: 20px;" type="text"/>	
ALLOCATED WEIGHT (Weight estimate agreed by purchaser and supplier based on order specs).		<input style="width: 100%; height: 20px;" 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 – 5

TYPE TESTING REQUIREMENT

Type Tests

1. **Aim:** Type Tests are a group of tests which are conducted to validate the designed characteristics of the equipment/ component. Type Testing is to demonstrate that an engine will perform satisfactorily over the entire engine life specified in the Technical Requirements.

2. **Applicability:** Type tests are carried out when:

- (a) **New Induction:** The equipment is being developed for the first time.
- (b) **Firm:** The firm or the manufacturer is producing the equipment for the first time.
- (c) **Design:** The design of existing equipment has been changed or modified.

3. **Scope:** There are various forms of Type Tests. The selection of Type Tests is governed by pertinent standards and promulgated policies. Some of the common Type Tests applicable to warship equipment are detailed below:

(a) **Shock Test:** This test is to certify that the equipment can withstand the forces likely to be experienced in case of explosions and impact. The shock values that the equipment is to withstand depend on the weight and its location within the ship. These values are indicated for all the three axis in every SOTR and the Purchase Order. Shock Testing machines are available in select places within the country, each having its own limit on the weight of the test piece. Equipment being tested on these machines are to be mounted in the same way as the likely installation onboard. Special jigs and fixtures may be required for arranging this mounting. The impacts are to be given along all the three axis. **For equipment beyond the capacity of the machines, the shock calculations have to be submitted by the firm along with results of Finite Element Analysis.**

(b) **Vibration Test:** The vibrations experienced by the equipment during transportation and in use are complex resulting from cumulative effect of the excitation force, mounting, impedance and inherent characteristics of the equipment itself. These vibrations are generally not amenable to simulation. Hence the equipment is subjected to induced vibrations of specified frequency and amplitude while running to check that the equipment does not malfunction.

4. **TYPE TEST/ EXTENDED PROTOTYPE TEST:**

4.1 **ELECTRICAL EQUIPMENT TYPE TEST**

(a) **Type test on Electrical Equipment.** The equipment is to undergo type testing if not tested before. All tests required are to be carried out as per Section 5 of specifications EED-Q-071(Rev-4) and a report submitted to naval Inspection Agencies. Alternator and exciter panel is to be type tested as per EED-Q-242(Rev-2). Type tests shall be carried out on electrical equipment as per table below:

Test	Specification	Test condition / severity
Vibration	JSS 55555- Test 28	5-33 Hz
High temp.	JSS 55555-Test 17	55 Deg C for 16 Hrs.



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Damp heat	JSS 55555-Test 10	Procedure G 40-95 Deg C RH for 16 Hrs
Drip proof	JSS 55555- Test 11	Vertical water drip 1 m height for 15 min
Mould growth	JSS 55555-Test 21	29 Deg C ,90% RH mould growth chamber for 28 days
Bumps	JSS 55555-Test 5	1000 bumps=40g, 6m/sec
Shock/impact	JSS 55555-Test 24	As per laid down conditions
	CL 0563 Sec 19	As per laid down conditions
Ship motion	GCR for 17A	As per laid down conditions
EMI /EMC	MIL-STD 461 E/F	EMI/EMC Requirements shall be as follows - For Motor, (a) CE 101,CE 102 (b) RE 101,RE 102 For Starter / Control Panel/UPS, (a) CE 101,CE 102 (b) RE 101,RE 102 (c) CS101,CS 114,CS 115 (d) RS 101,RS 103 For Alternator / Generator, (a) CE101, CE102 (b) RE101,RE102 RS101

5. SHOCK TESTING:

A broad overview of the IHQ MoD (Navy)'s Shock policy for onboard equipment and applicable shock standards is given below:

5.1 Shock Qualification: The equipment shall conform to Indian Navy shock grade 'A' as for combatant ships. For shock test MIL-S-901(D) can also be applicable. Equipment and its associated auxiliaries/accessories/controls shall be designed to withstand a shock occurrence (such as an underwater explosion) without any constraints on equipment functional performance, structural integrity and without any hazard to personnel or to other shipboard equipment. Brittle materials, such as grey cast iron, or any material having an elongation capability of less than 10 % shall not be used unless the stresses can be proved acceptable by shock testing the equipment.

5.1.1 Shock test/calculation/dynamic analysis, shall be performed by the equipment supplier based upon the weight of the equipment. The equipment are classified into three categories, based upon the weight, as below:

- (a) Up to 600 kg - Light
- (b) Between 600 to 2500 kg - Medium
- (c) Greater than 2500 kg - Heavy.



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5.1.2 Light and medium category prototype equipment is to be shock tested. Normally heavy category prototype equipment, is not to be shock tested, however if there are any features which indicates apprehensions on the shock capability, then shock test is to be undertaken. All "first of its kind" equipment are to be shock tested under the following conditions:

- (a) If there has been no prototype for the same, or
- (b) If the equipment differs considerably from the prototype, or
- (c) If major modifications have been undertaken on the tested equipment, which would have significant effect on the shock resistance of the equipment.

5.1.3 Equipment of a particular model, with any variance to a previously tested model is to be shock tested, as the dynamics of such equipment would be different from the originally tested equipment.

5.1.4 Shock qualification criteria will be considered on case-to-case basis, as indicated below:

- (a) Existing shock qualification certification of same/similar equipment (in case the equipment has already been shock tested to the required level, existing certification, is to be submitted by the equipment supplier).
- (b) Shock testing
- (c) Shock calculations or dynamic analysis (using finite element method).

5.1.5 For resiliently mounted equipment, the mounting system shall be capable of attenuating the shock impact below the inherent shock resistance characteristics of the concerned equipment. The installation and connections of the equipment shall account for the extreme displacements that may occur under shock conditions. Wherever necessary, suitable stops/snubbers shall be provided to prevent excessive motion.

5.1.6 Equipment which is subjected to shock testing, are to be "Yellow Banded" and is to be delivered by equipment supplier, for training or shore based applications for the Indian Navy.

5.2 Shock Testing Procedure:

5.2.1 **Scope of Testing:** The equipment, which is to be shock tested would be complete with all accessories viz. inter-connecting pipes, sensors, transmitters, indicators, gauges etc. In the case of electrical/electronic equipment, which is mounted separately, the same would be subjected to shock loads as stipulated in JSS 55555.

5.2.2 **Sequence of Testing:** The equipment which is required to be shock tested shall undergo the following tests (in that sequence):

- (a) Visual inspection to identify apparent defects.
- (b) Proving run or endurance run as per the duration and modes specified in technical requirements.
- (c) Shock test of the equipment to levels specified in technical requirements.
- (d) Visual inspection for apparent defects/looseness, which would have occurred due to shock loads.
- (e) Disassembly of the equipment into components and visual inspection.
- (f) NDT (DPT) of critical components.
- (g) Assembly and proving run of the equipment.



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5.2.3 The equipment is considered to have passed the shock test if the following conditions are satisfied:

- (a) There are no mechanical damages/failures.
- (b) There is no deterioration of performance of the equipment when compared to preshock test status.
- (c) There are no cracks, leakages of working medium/control medium or any other defects that may lead to degradation of characteristics of the article.
- (d) There is no change in status of switches (on/off) or malfunctioning of equipment/skid-mounted sensors, transducers, gauges etc.

5.2.4 Guidelines for Shock Qualification by Shock Calculations:

5.2.4.1 The following shall be considered explicitly in the calculations, which shall be made for each of the principal axes separately:

- (a) The mass of the equipment.
- (b) The strength and stiffness of the foundation.
- (c) The response of the sub-components of the equipment.
- (d) The duration of the shock loading.

5.2.4.2 The calculation/method employed for evaluation of the centre of gravity of the complete equipment and individual components are to be clearly indicated.

5.2.4.3 The complete material and physical properties of the components of the equipment are to be indicated.

5.2.4.4 The natural frequency of the equipment as mounted on the ship is to be either calculated or determined by tests. On evaluation of the natural frequency, the equipment/components are to be classified as either rigid/flexible as per guidelines in BR 3021 (I).

5.2.4.5 A Non-Linear Lumped Mass Modelling is to be adopted for evaluation of the characteristics of the equipment. The Boundary conditions and constraints applicable to the equipment are to be clearly specified in the model. Advanced techniques such as Finite Element Analysis and tools such as ANSYS/PAFEC code may be used for the analysis, clearly specifying the number of Nodes and Elements used for discretizing the equipment.

5.2.4.6 The "frequency ratio" of the natural frequency of the equipment to the shock input frequency is to be evaluated as per guidelines in BR 3021 (I).

5.2.4.7 The acceleration, velocity, time period values as applicable for the calculations are to be obtained as per guidelines in BR 3021 (I).

5.2.4.8 The permissible shock design stresses are to be obtained as per guidelines in BR 3021 (I).

5.2.4.9 The Bending Moment, Shear Force, Bending Stresses and Displacement as obtained in the calculations are to be clearly specified for the equipment and each individual component of the equipment. The effect on various clearances of the equipment / components is to be clearly stated in the calculations.



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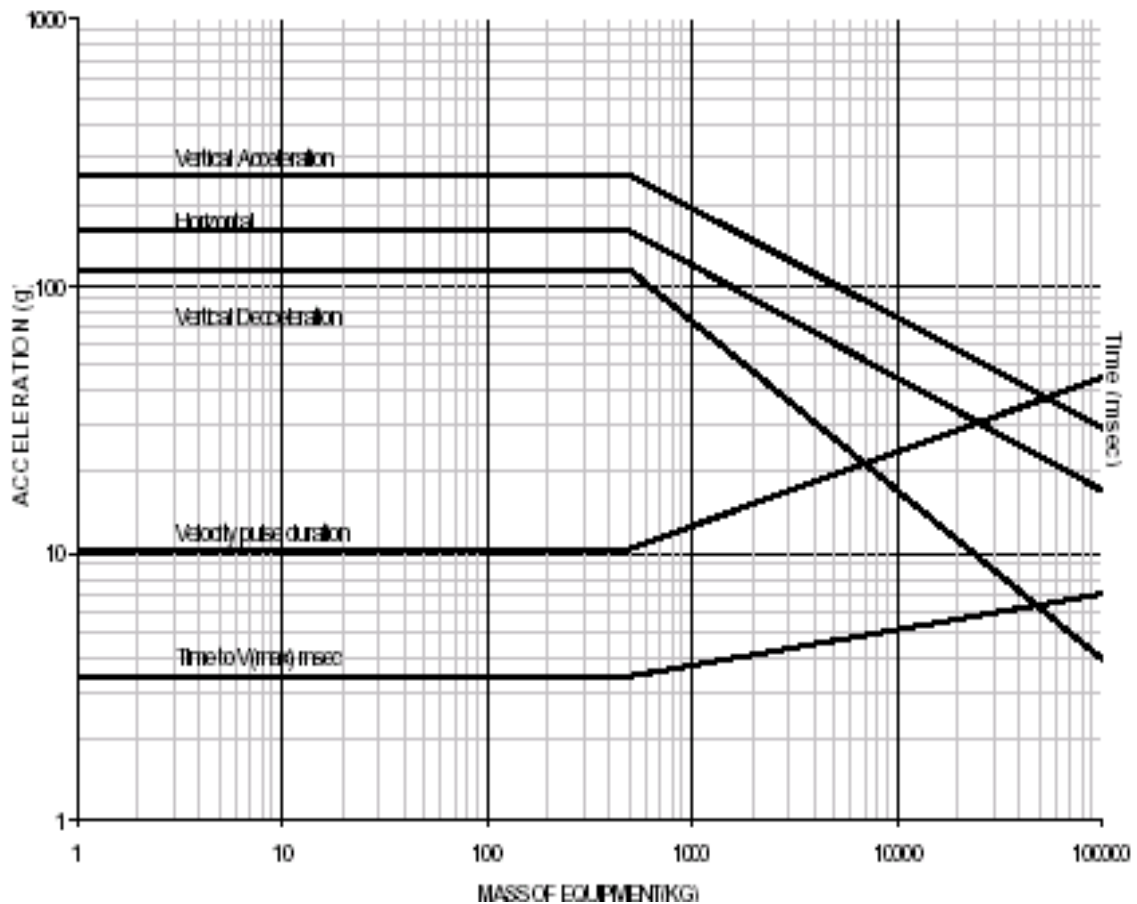
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Annexure – 6

SHOCK GRADE 'A' CURVE





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Annexure – 7

NOISE AND VIBRATION TARGETS

1/3 Octave centre Frequency (Hz)	Max acceptable SBN measured above mounts closest to the ship structure (2 nd stage of mounts)	Maximum acceptable Airborne Noise
	Acceleration dB (reference 0.00001 m/s ²) measured as per MIL-STD-740-2	Sound Power level (dB reference 1x10 ⁻¹² watts) measured as per ISO 9614-2
10	90.0	No targets – data to be recorded during FATS
13	90.0	
15	90.0	
20	90.0	
25	90.0	
32	90.0	
40	90.0	
50	91.5	94
63	92.5	94
80	93.0	94
100	93.7	97
125	94.5	97
160	95.0	97
200	95.0	94
250	95.0	94
316	95.0	94
400	95.0	90
500	95.0	90
630	95.0	90
800	95.0	90
1000	95.0	90
1250	98.0	90
1500	98.0	91
2000	98.0	91
2500	98.0	91
3160	98.0	92
4000	98.0	92
5000	98.0	92
6300	98.0	94
8000	98.0	94
10000	98.0	94



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ANNEXURE – III

GUIDELINES OF BANK GUARANTEE

1. Non- Judicial Stamp Paper – N. J. S. Paper of Rs. 500/- (Rupees Five Hundred Only) is to obtained in the name of the banker for execution of the Bank Guarantee. If a single Stamp Paper of Rs. 500/- is not available, Stamp Papers of multiple denominations may be used but the serial nos. or purpose of each Stamp Paper be of consecutive nos. and purchased on the same day. Such Stamp Paper should not be older than one year or the date of purchase Order / Contract whichever is applicable. Stamp Papers obtained in the name of the supplier will not be accepted.
2. Address of the Supplier / Contractor and the executing Bank should be incorporated in full in the Bank Guarantee.
3. Bank Guarantee should be executed by scheduled Banks preferably by Nationalised Banks and should be sent in Banker's sealed envelope directly to General Manager (Finance), Corporate Finance. M/s. Garden Reach Shipbuilders & Engineers Limited .43/ 46, Garden Reach Road. Kolkata – 700 024 super scribing the word "BANK GUARANTEE".
4. No. confirmation of BG is required to be obtained from issuing Bank if the BG executed by Scheduled / Nationalized Banks is received in Banker's sealed envelope.
5. Banker's confirmation is required in case of Bank Guarantee executed by Non-scheduled Banks / Cooperative Bank/ Regional Private Bank etc. and for those Guarantee which were not received in the terms of(3) above.
6. The Bank Guarantee should conform strictly in conformity with the terms and Conditions of the order and in GRSE's standard format prescribed against each of the above cases.
7. Expiry date should be in accordance with the requirement of contractual terms and the claim period for preferring the claim should not be less than six months from the date of expiry of any case.
8. Bank Guarantee shall be free from all infirmities and typographical errors / deletions / inclusions /riders etc., requires to be authenticated by Bank's signatory with official seal.
9. Issuing Bank should furnish confirmation towards execution of Guarantee immediately on receipt of GRSE's formal letter for same. Confirmation letter should contain GRSE's letter reference requested for and must be in Bank's sealed cover addressed to GRSE.



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FORMAT OF BANK GUARANTEE TOWARDS SECURITY DEPOSIT

- Ref: 1. BPE Notification No. BPE / G : 032/ 78/ 1 (4) Adv (F) / 69 dated 24.10.78
2. Ministry of Finance Deptt. of Economic Affairs Notification No. F. No. 0 (7) / B. 0. III / 75 dated 02.11.77

GUARANTEE BOND

(to be used by all scheduled banks)

In consideration of M/s. Garden Reach Shipbuilders & Engineers Limited, 43/ 46, Garden Reach Road, Kolkata – 700 024 (hereinafter called "The Buyer") having agreed to exempt M/s..... having its registered office at (hereinafter called "The Party") from the demand, under the terms and conditions contained in the Tender/ Purchase Order No..... dated (hereinafter called "the said Tender/Order") of security deposit for the due fulfillment by the said Party's of the terms and conditions contained in the said Order, on production of a Bank Guarantee for Rs. (Rupees only), we, Bank Limited (hereinafter referred to as "the Bank") do hereby undertake to pay to the Buyer an amount not exceeding Rs. against any loss or damage caused to or suffered by the Buyer by reason of any breach by the said Party of any of the terms and conditions contained in the said order.

2. We, Bank do hereby undertake to pay the amounts due and payable under this Guarantee without any demur, merely on a demand from the Buyer stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Buyer by reason of any breach by the said Party of any of the terms and conditions contained in the said order or by reason of the Party's failure to perform the said order. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee.

3. We, Bank Limited further agree to the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Tender/ Order and that it shall continue to be enforceable till all the dues of the Buyer under or by virtue of the said Tender/Order have been fully paid and its claims satisfied or discharged or till the Managing Director, Garden Reach Shipbuilders & Engineers Limited, certifies that the terms and conditions of the said order have been fully and properly carried out by the said Party and accordingly discharges the Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before the we shall be discharged from all liability under this Guarantee thereafter.

4. We, Bank Limited further agree with the Buyer that the Buyer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Tender/ Order or to extend time of performance by the said Party from time to time or to postpone for any time or from time to time any of the powers exercisable by the Buyer against the said Party and to forbear or enforce any of the terms and conditions relating to the said Tender/ Order



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and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Party or for any forbearance, act or omission on the part of the Buyer or any indulgence by the Buyer to the said Party or by any such matter of thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

5. We, Bank Limited lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Buyer in writing.

6. Notwithstanding anything contained hereinabove, the liability of the Guarantor under this Guarantee is restricted to Rs..... (Rupees) and that this Guarantee shall remain in force until its expiry on the..... (date), unless a suit or action to enforce a claim under this Guarantee is made against the Guarantor within six months from the aforesaid date of expiry, all the rights of the beneficiary under the said Guarantee shall be forfeited and the Guarantee shall be released and discharged from all liabilities thereof.

For Bank Limited.

Dated the day of 20.....



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PERFORMANCE BANK GUARANTEE TOWARDS SATISFACTORY PERFORMANCE

THIS DEED OF GUARANTEE made this.....day of.....BETWEEN..... (hereinafter called "THE BANK") which expression shall unless excluded by or repugnant to the context be deemed to include its successors in Office and assigns of the ONE Part and GARDEN REACH SHIPBUILDERS AND ENGINEERS LIMITED, having their Head Office at 43/46, GARDEN REACH ROAD, KOLKATA – 700 024 (hereinafter called "THE BUYERS") which expression shall unless excluded by or repugnant to the context be deemed to include their successors in office and assigns of the other part.

WHEREAS, Messrshaving its registered office at(hereinafter called "THE SELLER") have accepted an Order No.....for supply of..... from the Buyer to manufacture and deliver the same to Buyer in good condition.

AND WHEREAS it is one of the terms of the said order that the Seller shall furnish to the Buyer a Bank Guarantee comprising% of the value of the order amounting to Rs.....(Rupees) only for the satisfactory performance of the equipments supplied against the said order at least for a period of..... from the date of supply i.e. from

AND WHEREAS the Buyer has agreed to accept such Bank Guarantee.

NOW THIS INDENTURE WITNESSETH THAT in consideration of the premise the Bank hereby unequivocally undertakes and agrees with the Buyer to pay to the Buyer upon demand in writing whenever required so by them to do and within a fortnight from the date of such demand sum or sums not exceeding in the whole of Rs..... (Rupees) only as may become payable to the Buyer by the seller by virtue of or arising out of the Terms and Conditions of the said order.

Provided it is hereby expressly stipulated and agreed that if any question arises as to whether any sum has become payable by the seller to buyer by virtue of or arising out of the said order, the decision of the Buyer will be final and conclusive and the Guarantee herein contained shall not be revocable by notice or by reason of dissolution or winding up of the business of the seller of any change in the constitution or composition of the Seller's business and the liability of the Bank under this presents shall not be impaired in any way by any extension of time or variation or alteration made given conceded in the conditions of the said order or any other indulgence given by the buyer or by reasons of any failure on the part of the Buyer to enforce any of their remedies against the Sellers and/ or by reasons of failure on the part of the Buyer to observe or perform any of the stipulation contained in the said order and to be observed or performed by the Sellers or by any other dealings between the Buyer and the Seller whether any of the above takes place with or without the knowledge of the Bank and that the Guarantee herein contained shall remain in full force and virtue only. All claims and demands of the Buyer arising out of or in connection with the said order have been fully paid and satisfied PROVIDED ALWAYS AND IT IS HEREBY AGREED BETWEEN THE PARTIES THAT a Bank's liability under this Indenture shall



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remain in full force from the date of issue of the Guarantee till and is limited to a sum of Rs. (Rupees) only.

NOTWITHSTANDING anything stated above our liability under the Guarantee is restricted to Rs..... (Rupees.....) only. Our Guarantee shall remain in force upto And unless a claim or demand in writing is made on the Bank within 6 months from the date of expiry of the Bank Guarantee the Bank shall be released and discharged from all liabilities thereunder.

Signature of Bank's Authorised Signatories
with Code No., Name, Designation and
Bank Stamp

Date:



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ANNEXURE – IV

INTEGRITY PACT TO BE EXECUTED FOR HIGH VALUE ORDERS

1. IN FORMAT ENCLOSED.
2. IN NON – JUDICIAL STAMP PAPER OF VALUE RS. 110 /-.
3. TO BE EXECUTED BY PERSON WITH APPROPRIATE AUTHORITY.



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INTEGRITY PACT

Between M/s. Garden Reach Shipbuilders & Engineers Limited (GRSE) hereinafter referred to as "The Principal"

and

..... hereinafter referred to as
" the Bidder /Contractor"

The Principal intends to award, under laid down organizational procedures, contract/insert/delete's for..... The Principal values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness /transparency in its relations with its Capital Bidder(s)/ or Contractors(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitor (IEM), who will monitor the tender process and the execution of the contract for compliance with the principals mentioned above.

Section 1 - Commitments of the Principal

[1] The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

a. No employee of the Principal, personally or through family members, will in connection with the tender for , or the execution of a contract, demand, take a promise for or accept for self or third person, any material or immaterial benefit which the person is not legally entitled to.

b. The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provided to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

c. The principal will exclude from the process all known prejudiced persons.

[2] If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions.



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Section 2 – Commitments of the Bidder(s)/ Contractor(s)

[1] The Bidder(s) /Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

a. The Bidder(s) / Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

b. The Bidder(s)/Contractor(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

c. The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act; further the Bidder(s)/Contractor(s) will not use improperly, for purpose of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

d. The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly the Bidder(s) /Contractor(s) of Indian Nationality shall furnish the name and address of the foreign particulars, if any. Further details as mentioned in the "Guidelines on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s) /Contractor(s). Further as mentioned in the Guidelines all the payments made to the Indian agent/representative have to be in Indian Rupees only, copy of the "Guidelines on Indian agent of foreign Supplier" is annexed and marked as annex.

e. The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

[2] The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offence.

Section 3 – Disqualification from tender process and exclusion from future contracts.

If the Bidder(s)/Contractor(s) before award or during execution has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s) /Contractor(s) from the tender process or take action as per the procedure mentioned in the "Guidelines on Banning of business dealings" is annexed and marked as Annex – B".



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Section 4 – Compensation for Damages.

- (1) If the *Principal* has disqualified the Bidder(s) from the tender process prior to the award according to section 3, the Principal is entitled to demand and recover the damages equivalent to earnest Money Deposit /Bid Security.
- (2) If the principal has terminated the contract according to section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the Contract value or the amount equivalent to Performance Bank Guarantee.

Section 5, - Previous Transgression

- (1) The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- (2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealing".

Section 6 - Equal treatment of all Bidders / Contractors / Sub-contractors.

- (1) The Bidder(s) /Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
- (2) The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Sub-contractors.
- (3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or its provisions.

Section 7 – Criminal charges against violating Bidder(s) Contractor(s)/Subcontractor(s)

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Section 8 – Independent External Monitor /Monitors

- (1) The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- (2) The Monitor is not subject to instructions by the representative of the parties and performs his functions neutrally and independently. He reports to the Chairman GRSE.



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(3) The Bidder(s) /Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The monitor is under contractual obligation to treat the information and documents of the Bidder(s) /Contractor(s) /Subcontractor(s) with confidentiality.

(4) The Principal will *provide* to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor, The parties offer to the Monitor the option to participate in such meetings.

(5) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

(6) The Monitor will submit a written report to the Chairman, GRSE within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.

(7) Monitor shall be entitled to compensation on the same terms as being extended to / provided to Independent Directors on the GRSE Board.

(8) If the Monitor has reported to the Chairman GRSE a substantiated suspicion of an offence under relevant IPC/PC Act, and the Chairman GRSE has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.

(9) The word '**Monitor**' would include both singular and plural.

Section 9 – Pact Duration:

This pact beginswhen both parties have legally signed it. It expires for the Contractor 18 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded. If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged by Chairman of GRSE.



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Section 10 – Other provisions:

- 1) This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal i.e. Kolkata.
- 2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 3) If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

(For & On behalf of the Principal)

(For & On behalf of Bidder/Contractor)

(Office Seal)

(Office Seal)

Place.....

Date.....

Witness 1:

(Name & Address)

Witness 2:

(Name & Address)



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(भारत सरकार का उपक्रम) (A Govt. of India Undertaking)(रक्षा मंत्रालय) (Ministry of Defence)

Plant Plaza Road, Dhurwa, Ranchi-834004

ANNEXURE - A TECHNICAL BID

SUPPLY OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A.

E-Tender No.: DEP/LT/ST/P17A/P16-22/EXHAUST SYSTEM DTD. 07.10.2022

NAME & ADDRESS OF THE BIDDER WITH REFERENCE NO./DATE*

SL. NO.	DESCRIPTION	QTY	UNIT	REMARKS
1	Shi Side Exhaust System with accessories, Comprising of following items (but not limited to):	28	SET	
	(A) Exhaust duct/pipe (SS 316)			
	(B) Compensators/ Bellows (SS 316)			
	(C) Primary silencers (SS 316)			
	(D) Flexible supporting assembly / Mounting brackets with fixed and Sliding supports			
	(E) Instrumentation assembly			
	(F) Thermal insulation assembly			
	(G) Pressure sensors for measuring exhasut back pressure			
	(H) Temperature sensors			
	(I) Different sizes/type of fasteners (SS 316), Gaskets & consumables			
2	IRSS device (water cooled) with accessories and its cooling arrangement, comprising mainly the following items (but not limited to) :	28	SET	
	(A) IRSS Device (Titanium)			
	(B) Primary injectors (Titanium)			
	(C) Exhaust duct/pipe (Titanium)			
	(D) Main silencers (Titanium)			
	(E) Hull valve (Titanium)			
	(F) Hull penetartion assembly			
	(G) CAP assembly			
	(H) Flexible supporting assembly / Mounting brackets with fixed and Sliding supports			
	(I) Instrumentation assembly			
	(J) Pump, motor assembly with control/starter panel			
	(K) Valves & header assembly			
	(L) Control system assembly			
	(M) Thermal insulation assembly			
	(N) Tempearture sensors			
	(O) Different size/type of fasteners (SS 316), gaskets & consumbales			
3	Exhaust Y-Piece (SS 316) with different size/type of fasteners (SS 316), gaskets & consumbales	20	NOS	
4	Onboard spares & tools for 1 year	7	SET	
5	B&D spares for 4 ships of MDL	1	SET	
6	B&D spares for 3 ships of GRSE	1	SET	
7	Commissioning spares	7	SET	
8	Documentation	7	SET	
9	Service engineer for erection/installation & commissioning	7	SET	
10	Training	7	SET	



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ANNEXURE - B

COMMERCIAL TERMS AND CONDITIONS

SUPPLY OF SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A.

E-Tender No.: DEP/LT/ST/P17A/P16-22/EXHAUST SYSTEM DTD. 07.10.2022

NAME & ADDRESS OF THE BIDDER *				
OFFER REFERENCE NO./DATE*				
Currency	INR			
QUOTATION VALID TILL*				
MAJOR TERM(S)		VENDOR TO CONFIRM		
Sl. No.	ATTRIBUTE	OPTIONS		
1	SCOPE OF SUPPLY ACCEPTED AS PER NIT	YES		
2	PAYMENT TERMS ACCEPTED AS PER NIT	YES		
3	PENALTY & LIQUIDATED DAMAGES CLAUSES ACCEPTED AS PER NIT	YES		
4	GUARANTEE/WARRANTY TERMS ACCEPTED AS PER NIT	YES		
5	3% SECURITY DEPOSIT BANK GUARANTEE ACCEPTED AS PER NIT	YES		
6	3% PERFORMANCE BANK GUARANTEE OR 10% RETENTION IN LIEU OF PBG	YES		
7	DELIVERY TERM(S)* ACCEPTED AS PER NIT	YES		
8	DESPATCH MODE BY ROAD BY VENDOR'S OWN ARRANGEMENT	YES		
9	TERM OF PRICE AS PER NIT	YES		
10	ORDER TO BE PLACED ON			
11	PAYMENT TO BE MADE TO (IF ANOTHER AGENCY) PLEASE INDICATE LATEST BANK DETAILS			
12	COMMERCIAL TERMS			
13	DELIVERY SCHEDULE * (PLEASE CONFIRM/INDICATE YOUR DELIVERY SCHEDULE)	YES		
14	TECHNICAL COMMENTS (PLEASE INDICATE TECHNICAL DETAILS OF YOUR MANUFACTURE)			
TAXES, DUTIES, LEVIES, FEES & CHARGES (IN ADDITION TO QUOTED FREIGHT CHARGES)				
Sl. No.	ATTRIBUTE	INDICATOR	FIRM TO CONFIRM	ENTRY
1	GST	PERCENTAGE	G.S.T EXTRA AS APPLICABLE AT THE TIME OF SUPPLY(PRESENT VALUE IS INDICATED)	_____ %
2	MISCELLANEOUS CHARGES DETAIL(S) IF ANY	PERCENTAGE		
3	MISCELLANEOUS CHARGES AMOUNT	VALUE		

NOTE:

PLEASE PUT VALUE FOR "SELECT AN OPTION"

* Indicates Mandatory Fields.

- 1) ALL OTHER TERM(S) AND CONDITION(S) OF THE TENDER ARE TO BE ACCEPTABLE. DEVIATIONS, WHEREVER APPLICABLE HAVE BEEN INDICATED IN THE OFFER AS ABOVE.
- 2) ATTACH SUPPORTING DOCUMENTS (PRICE NOT TO BE MENTIONED HERE ELSE OFFER WILL BE REJECTED).



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ANNEXURE - C

PRICE BID

ITEM: SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651,12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)

DEP/LT/ST/P17A/P16-22/EXHAUST SYSTEM DTD. 07.10.2022

NAME & ADDRESS OF THE BIDDER WITH REFERENCE NO./DATE*

Enquiry Sl. No.	Yard No.	Sl. No.	Material Description	Qty Required per Shipsets	UOM	Currency	UNIT PRICE	TOTAL PRICE	GST (PERCENTAGE)	GST AMOUNT	TOTAL AMOUNT
1	12651	10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
2		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
3		30	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
4		40	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
5		50	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
6		60	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
7	12652	10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
9		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
		30	EXHAUST Y.PIECE	4	EA	INR		0.00		0.00	0.00
11		40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
12		50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
13		60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
14	12653	70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
15		10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
17		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
		30	EXHAUST Y.PIECE	4	EA	INR		0.00		0.00	0.00
19		40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
20		50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
21	12654	60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
22		70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
23		10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
25		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
26		30	EXHAUST Y.PIECE	4	EA	INR		0.00		0.00	0.00
27		40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
28	3022	50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
29		60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
30		70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
31		10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
33		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
35		30	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
36	3023	40	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
37		50	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
38		60	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
39		10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
41		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
42		30	EXHAUST Y.PIECE	4	EA	INR		0.00		0.00	0.00
43	3024	40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
44		50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
45		60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
46		70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
47		10	EXHAUST SYSTEM	4	EA	INR		0.00		0.00	0.00
49		20	IRSS DEVICE WITH PUMP ASSEMBLY	4	EA	INR		0.00		0.00	0.00
50	3024	30	EXHAUST Y.PIECE	4	EA	INR		0.00		0.00	0.00
51		40	ONBOARD SPARES_1 YEAR_EXHAUST SYSTEM	1	SET	INR		0.00		0.00	0.00
52		50	DOCUMENTATION_EXHAUST SYSTEM WITH IRSS DEVICE	1	SET	INR		0.00		0.00	0.00
53		60	INSTALLATION OF EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
54		70	TRAINING FOR EXHAUST SYSTEM WITH IRSS DEVICE	1	AU	INR		0.00		0.00	0.00
55		B&D SPARES FOR MDL Yard Nos. 12651, 12652, 12653, 12654			1	SET	INR		0.00		0.00
56	B&D SPARES FOR GRSE Yard Nos. 3022, 3023, 3024			1	SET	INR		0.00		0.00	0.00
TOTAL FOR 7 SHIPSETS											0.00

NOTE-

- Quantity indicated against each line item above is for ONE shipset. Total requirement is for Seven ships.
- Price quoted above should be inclusive of OBS, Documentation, Service Engineer charges (if any) and any other items as per the SOTR.
- Inspection Charges: Prices quoted should be inclusive of QAE inspection/Class Inspection Charges (IRS/ABS/LRS etc) for Drawing Approval / QAP approval / Type Test / FAT / In-process inspection / On board inspection wherever applicable as per Class Rule / STOR requirement and will be arranged and paid by the Supplier directly to the Classification Agency. TPIA inspection charges shall be arranged and paid by GRSE directly to TPIA for the accepted items only.
- Offer for B&D Spares should be submitted in Technical Bid (PART-A of offer) and Price bid (PART-B of Offer) with details as per ILMs format, if in case the same falls under the Scope of Supply as per SOTR.



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ANNEXURE - I

ACCEPTANCE FORMAT (MATRIX) OF INSTRUCTION TO BIDDERS

ITEM: SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651,12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)

E-Tender No.: DEP/LT/STP17A/P16-22/EXHAUST SYSTEM DTD. 07.10.2022

COMPANY NAME & ADDRESS *

NAME & DESIGNATION *

CONTACT DETAILS (e-MAIL-ID, FAX NO., PHONE NO., MOBILE NO.) *

OFFER REFERENCE NO./DATE*

INSTRUCTION TO BIDDERS

SL NO	Bidder's Remarks	Bidder's Comments (reference of technical offer clause must be indicated in case of deviation)	SL NO	Bidder's Remarks	Bidder's Comments (reference of technical offer clause must be indicated in case of deviation)
1			26.g		
2			26.h		
3			27		
4			28		
5.a			29		
5.b			30		
5.c			31		
5.d			32		
5.e			33		
5.f			34		
6.a			35		
6.b			36		
6.c			37		
6.d			38		
6.e			39		
6.f			40.a		
6.g			40.b		
7			41.i		
8			41.ii.a		
9			41.ii.b		
10.A			41.ii.c		
10.A.i			41.iii		
10.A.ii			41.iv		
10.B.i			42		
10.B.ii			42.A		
10.C			42.B		
10.D			43		
10.E			44		
11			45.a		
12			45.b		
12.1			45.c		
12.2			46.a		
12.3			46.b		
12.4			46.c		
12.5			47.a		
12.6			47.b		
13			47.c		
14			47.d		
14.a			47.e		
14.b			47.f		
15			48		
16			49		
17			50		
18			51		
19			52		
20					
21					
22					
23					
24					
25					
26.a					
26.b					
26.c					
26.d					
26.e					
26.f					

- Bidders should read the Instruction to bidders included in the Tender carefully prior to filling up this acceptance format.
- This format should be properly filled, signed and returned along with your technical bid for considering your bid.
- Please indicate - ACC- For accepted, NO - For not accepted and DEV - For deviation taken. (and corresponding reference of your Technical Literature submitted separately)
- Separate sheet to be attached for any deviation taken by you.
- Instruction to bidders clause SI Numbers shown in the format includes the Sub SI No under them also.



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ANNEXURE - II

ACCEPTANCE FORMAT (MATRIX) OF SOTR

ITEM: SHIP SIDE EXHAUST SYSTEM WITH IRSS DEVICE FOR 1 MW DIESEL ALTERNATOR FOR P17A (MDL Yard Nos. 12651,12652, 12653, 12654 & GRSE Yard Nos. 3022, 3023, 3024)

E-Tender No.: DEP/LT/ST/17A/P16-22/EXHAUST SYSTEM DTD. 07.10.2022

COMPANY NAME & ADDRESS *

NAME & DESIGNATION *

CONTACT DETAILS (e-MAIL-ID, FAX NO., PHONE NO., MOBILE NO.) *

OFFER REFERENCE NO./DATE*

SOTR SL NO	Bidder's Remarks	Bidder's Comments (reference of technical offer clause must be indicated in case of deviation)	SOTR SL NO	Bidder's Remarks	Bidder's Comments (reference of technical offer clause must be indicated in case of deviation)
1			26.a		
1.a			27		
1.b			28		
1.c			28.a		
1.d			28.b		
1.e			28.c		
1.f			29		
2			30		
3.A			31		
3.B			32		
3.C			33		
3.D			34		
3.E			35		
3.F			36		
3.G			37		
3.H			38		
3.I			39		
3.J			40		
4.a			41		
4.b			42		
4.c			43.a		
4.d			43.b		
4.e			43.c		
4.f			44		
4.g			45.a		
4.h					
4.i			45.b		
5.a			46		
5.b			47		
6			48		
7			49		
8			50		
9			51		
10			52		
11			53		
12.a			54		
12.b			55		
13			56		
14.a			57		
14.b			58		
15			59		
15.a			60		
15.b			61		
15.c			62		
16			63		
17.a			64		
17.b			65		
18					
19					
20					
21					
22					
23					
24					
25.A					
25.B					

- Bidders should read the SOTR included in the Tender carefully prior to filling up this acceptance format.
- This format should be properly filled, signed and returned along with your technical bid for considering your bid.
- Please indicate - ACC- For accepted, NO - For not accepted and DEV - For deviation taken. (and corresponding reference of your Technical Literature submitted separately)
- Separate sheet to be attached for any deviation taken by you.
- SOTR Sl Numbers shown in the format includes the Sub Sl No under them also.