



GARDEN REACH SHIPBUILDERS & ENGINEERS LIMITED

गार्डन रीच शिपबिल्डर्स एण्ड इंजीनियर्स लिमिटेड

(A GOVERNMENT OF INDIA UNDERTAKING)

(भारत सरकार का प्रतिष्ठान)

Registered & Corporate Office Address: GRSE Bhavan, 61, Garden Reach Road, Kolkata – 700 024

Phone दूरभाष: (033)2469-8100 to 8113, Extn बिस्तार: 200

Web site वेब: www.grse.in, E-Mail ई मेल: dey.ashimkumar@grse.co.in

CIN सी आई एन: L35111WB1934GOI007891

NOTICE INVITING TENDER (NIT)

To,
M/s. INDIAN INSTITUTE OF TECHNOLOGY, IIT MADRAS
SARDAR PATEL ROAD, GUNDY,
600036 CHENNAI

Garden Reach Shipbuilders & Engineers Limited is a leading Warship Builders and Engineering Product Company, invites M/s. Indian Institute of Technology, IIT Madras to submit single stage two part (Part I- Techno-Commercial & Part II- Price) bids through e-tendering mode for the work package as per following bid document:

NIT SLA No. निविदा संख्या:	SCC/AKD/ST/ORV VESSEL/038/ET-2052	Dated: 17/01/2024
Job Title कार्य का नाम:	SERVICES FOR OPTIMIZATION OF HULL FORM OF RESEARCH VESSEL (ORV) THROUGH RESISTANCE MODEL TEST	
Tender issuing Dept. बिभाग द्वारा जारी :	Contract Cell (संविदा बिभाग), GRSE 61 Park	

ARTICLE 1 अनुच्छेद-1: SCHEDULE OF CALENDAR DATES र्ियावी की अनुरूची:

SCHEDULE सारणी		
Bid submission Closing Date निविदा जमा की अंतिम तिथी	19/01/2024	12:00 hrs.
Tender Opening Date (Part I) निविदा खुलने की तिथी (तकनीकी- वाणिज्यिकबोली भाग-I)	19/01/2024	15:00 hrs.
Offer Validity Period minimum ऑफर की नियुक्तम वैधता अवधी	180 days from date of opening of Tender (Part – I)	

ARTICLE 2 अनुच्छेद - 2: COMMERCIAL REQUIREMENT FOR THE NIT निविदा की ब्यवसायिक आवश्यकता:

FEES / DEPOSITS	
Security Deposit (SD) प्रतिभूति	5% of Work Order Value (inclusive of GST)
Liquidated Damages परिनिर्धारित नुकसान	0.5% per week, Max. 5% of unexecuted job
Billing Frequency बिल करने की अवधी	Stage Wise

Note: -If any vendor other than **M/s. Indian Institute of Technology, IIT Madras** participates in this tender, then their offer will be **Rejected** outright.

ARTICLE 3 अनुच्छेद - 3: ANNEXURES FORMS PART OF THIS TENDER निविदा की संलग्नक प्रपत्र:

Please find all enclosures as indicated below in GRSE website by clicking the link <http://www.grse.in/index.php/tender.html> and then click **Enclosure to all sub-contracting activities.**

ANNEXURES	DOCUMENT DESCRIPTION
Annexure 1 संलग्नक-1	Statement of Technical Requirements (SOTR)
Annexure 2 संलग्नक-2	GRSE Standard Terms and Conditions (STAC) (please refer www.grse.in → Tender → Enclosures Related to tenders of Sub-Contracting Activities)
Annexure 3 संलग्नक-3	Check List for Bill submission
Annexure 4 संलग्नक-4	Special condition of contract (please refer www.grse.in → Tender → Enclosures Related to tenders of Sub-Contracting Activities)
Annexure 5 संलग्नक-5	Contractors Responsibility (please refer www.grse.in → Tender → Enclosures Related to tenders of Sub-Contracting Activities)
Annexure 6 संलग्नक-6	General Requirement (please refer www.grse.in → Tender → Enclosures Related to tenders of Sub-Contracting Activities)
Annexure 7 संलग्नक-7	Bank Guarantee Format for SD (please refer www.grse.in → Tender → Enclosures Related to tenders of Sub-Contracting Activities))

ARTICLE 4 अनुच्छेद - 4 : DOCUMENTS TO BE UPLOADED अपलोड हेतु दस्तावेज :

Self-Attested documents are to be scanned and uploaded with Part I of bid बिड के भाग-1 के साथ स्कैन एवं अपलोड हेतु स्वअभिप्रामाणित दस्तावेज	
1	MSME/NSIC certificate, if any
2	PAN /TAN, GST, Labour License Certificate, Registration Certificate of the Company with ROC, Memorandum and the Article of Association of the firm, confirming documents of Company's registered, branch office address etc.
3	Check List for Bill Submission of Contractor Annexure-3

Note: In case of non-submission of documents as mentioned above, the bidder is liable to be considered as disqualified.

ARTICLE 5 अनुच्छेद - 5: JOB EXECUTION SCHEDULE कार्य निष्पादन:

(A) Job Starting Date कार्य आरम्भ तिथी - The job has to be commenced immediately on receipt of PO/LOI/LOA & as per instruction of Manger (Design) /nominated Officer from CDO.

(B) Job Completion date कार्य समाप्ती तिथी – The total Job has to be completed within 05 weeks from the date of receipt of PO/LOI/LOA.

(C) Place of Work: Department of Ocean Engineering, IIT Madras.

ARTICLE 6 अनुच्छेद - 6: JOB EXECUTION कार्य निष्पादन:

Job is to be carried out strictly as per **SOTR No. RN/FD/RV/MT/001 at Annexure 1** and in case of doubt, instructions of GM (Design) / his nominated representative are to be followed.

ARTICLE 7 अनुच्छेद - 7: GUARANTEE & WARRANTEE गारंटी एवं वारंटी: Not Applicable.

ARTICLE 8 अनुच्छेद - 8: PRICE मूल्य:

Price quoted will be firm and fixed till the tenure of the contract. Price is to be quoted with all taxes & duties except GST. GST is to be indicated separately in the Price Bid and will be paid extra as per applicable rate. No escalation whatsoever will be considered under any circumstances within the valid tenure of contract.

ARTICLE 9 अनुच्छेद - 9: ESCALATION मूल्य वृद्धि: Not Applicable

ARTICLE 10 अनुच्छेद - 10: UNREASONABLE QUOTES अतर्कसंगत भाव: Not Applicable

ARTICLE 11 अनुच्छेद - 11: OFFER VALIDITY प्रस्ताव की वैधता:

Offer should be valid for 180 days from the date of opening of Part-I bid i.e. Techno-commercial bid. Under exceptional circumstances GRSE may request for extension of price validity, beyond 180 days against valid reason.

ARTICLE 12 अनुच्छेद - 12: CONDITIONAL OFFER सशर्त प्रस्ताव:

Conditional offers w.r.t. this tender will not be accepted.

ARTICLE 13 अनुच्छेद - 13: DETERMINATION OF L1 एल-1 का चयन: Not Applicable as the job will be awarded to **M/s. Indian Institute of Technology, IIT Madras.**

ARTICLE 14 अनुच्छेद - 14: BOQ बी ओ क्यू:

BOQ as part of SOTR given in the tender is tentative. It may vary according to actual requirement of job during the period of contract. The Bidder has to execute the required quantity at same Rate, Terms & Conditions. However, the Contractor will be paid based on actual quantity executed as per GRSE certification.

BOQ as per SOTR is given below:

SI No.	Description of the Job	UOM	Quantity
1.	Resistance Model test Research Vessel	EA	1

NB: i) UOM = Unit of Measurement, EA= Each. Details as per SOTR.

ARTICLE 15 अनुच्छेद - 15: OPENING OF BIDS निविदा खुलना:

Part I (Techno-commercial) bid will be opened on the date declared in NIT. Part II bid will be opened post techno-commercial evaluation by GRSE. Price bid of only those who qualify techno-commercially will be opened. Disqualified bidders, either during technical assessment or commercial discussion will also be intimated about their non-consideration for further processing.

ARTICLE 16 अनुच्छेद - 16: MICRO & SMALL ENTERPRISES सूक्ष्म एवं छोटे उद्योग: Not Applicable

ARTICLE 17 अनुच्छेद - 17: AWARDING JOBS TO MULTIPLE BIDDER बहुल बिडर के लिए ठेका कार्य: Not Applicable as the job will be awarded to **M/s. Indian Institute of Technology, IIT Madras**

ARTICLE 18 अनुच्छेद - 18: ELIGIBILITY CRITERIA पात्रता के मापदंड: Not Applicable

ARTICLE 19 अनुच्छेद - 19: INSTRUCTION TO THE BIDDERS बिडर हेतु अनुदेश:

1. Before submitting a bid, **M/s. Indian Institute of Technology, IIT Madras** is expected to examine the Bid Documents carefully, if they desire, may visit the work front, fully inform themselves of existing conditions and limitations including all items described in the Bid Documents. NO consideration will be granted for any alleged misunderstanding or the materials to be furnished, work to be performed or actual considerations to complete all work and comply with conditions specified in the Bid Document.
2. Any qualified deficiency, errors, discrepancies, omissions, ambiguities or conflicts in the Bid Documents, or there be any doubts as to the meaning of a provision or requirement, the same shall immediately brought to notice of GRSE Tendering Dept. in writing not less than 07 days prior to bid closing date.
3. It is understood that in receiving this bid, GRSE assumes no obligation to enter into a contract for the WORK covered by this bid request. GRSE reserves the right to reject any and all unqualified proposals or waive irregularities therein. GRSE reserves the right to evaluate each and every proposal and accept the whole or any part of the tender and the Tenderer shall be bound to perform the same at the rates quoted.
4. GRSE also reserves the right to reject any and all bids and accept the bid, which in its opinion, appears to be most advantageous to GRSE. Receipt and review of this Bid Request constitutes an agreement of confidentiality between GRSE and each of the contracting Firms preparing its Bid. GRSE reserves the right to change the form of this request to Bids, or make clarifications thereto, within a reasonable time before date of submission of Bids.
5. Generally, Contractor will assume all safety responsibility for the site and will furnish and maintain its own safety program for itself and its sub-contractors. Contractor are bound to comply with all applicable Environmental, Occupational Health & Safety rules, regulations, procedures and guidelines when performing work in the facility or site.
6. **M/s. Indian Institute of Technology, IIT Madras** objecting on any grounds to any bid specification or legal requirements imposed by these bidding documents shall provide written notice to GRSE within 03 calendar day from the day bid document was made available to public. Failure of a bidder to object in the manner set forth in this paragraph shall constitute and irrevocable waiver of any such objection.
7. Job is to be carried out as per SOTR and instruction of the Engineer in-charge/Quality/Inspection Authority of GRSE.
8. Any Drawings or technical information attached / provided with this NIT is the Intellectual Property of the Company and will be governed by the specific Acts applicable thereto.
9. As applicable, Post submission of Tender, such drawings and technical information are to be physically returned. Also, all soft copies are to be destroyed and a self-certification to be submitted during TNC, failing which the processing of bid will not be taken further.

10. Contractors are responsible to clean up the area of work w.r.t all sort of debris generated on daily basis. If they fail to do so GRSE reserves the right to perform the cleaning activity and charge the contractor with penalty of up to 25%.
11. Bidder has to declare, in what capacity he is participating in the tender viz PSU, Limited Co, Pvt. Ltd. Co. etc. Supporting documents (scanned copy) confirming such status to be uploaded as attachment to Part I bid.
12. A Bidder is allowed to submit only one Bid under any capacity / status.
13. Difficulty in submitting the bid:
 - a. Any query/difficulty in understanding of SOTR or other Technical Terms may be got clarified from **Mr. Abhimanyu Badhavath, Mgr (CDO), Main Unit (e-mail: Badhavath.Abhimanyu@grse.co.in Mobile No. +91 7596094145** prior to submission of offer.
 - b. The commercial aspects may be got clarified from **Mr Ashim Kumar Dey, SM (Contract)/61 Park, Mobile No.+91 75960 23717, e-mail: Dey.AshimKumar@grse.co.in** prior to submission of offer.
 - c. Any difficulty in submitting / uploading of e-tender or for any system help **Mr. Saraswata Palit, SM (GRSE E-PROCUREMENT), e-mail/ Palit.Saraswata@grse.co.in / GRSE Service Provider** may be contacted [Land line no: 033 24893902]
14. **E-mail Address for communication संचार हेतू ई. मेल पता:** Vendor to provide e-mail address to enable faster communication.
15. **e-BID INSTRUCTION ई बिड के अनुदेश:**
 - a) To participate in the e-Bid submission for GRSE, it is mandatory for the bidders to get their firms registered with GRSE E-Procurement portal <https://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-I (Techno-Commercial) bid documents along with all attachments in E-Procurement portal <https://eprocuregrse.co.in>; Central Public Procurement Portal <https://eprocure.gov.in/cppp/> and GRSE website <http://www.grse.in/index.php/tender.html>. 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 work.
- i) **AMENDMENT OF TENDER DOCUMENT**
 - i. Before the deadline for submission of tenders, the Tender Document may be modified by GRSE Ltd. by issue of addenda/corrigendum. Issue of addenda / corrigenda will however be stopped 7 days prior to the deadline for submission of tenders as finally stipulated.
 - ii. Addendum/corrigendum, if any, will be hosted on website / e procurement portal and shall become a part of the tender document. All Tenderers are advised to see the website for addendum/ corrigendum to the tender document which may be uploaded up to 7 days prior to the deadline for submission of Tender as finally stipulated.
 - iii. To give prospective Tenderers reasonable time in which to take the addenda/ corrigenda into account in preparing their tenders, extension of the deadline for submission of tenders may be given as considered necessary by GRSE.
- j) GRSE will follow the guidelines & directives as promulgated by GOI post COVID 19 pandemic outbreak. All the qualified bidders have to quote considering the same accordingly.

ARTICLE 20 अनुच्छेद - 20: BID REJECTION CRITERIA बिड अस्वीकृति के मापदंडः

Following bid rejection criteria may render the bids liable for rejection:

1. Bidder's failure to furnish sufficient or complete details for evaluation of the bids within the given period which may range in between two to three weeks depending on the deficiencies noticed in the drawings / technical data which shall not however conflict with validity period.
2. Incomplete / misleading / ambiguous bid in the considered opinion of the Technical Negotiation Committee (TNC)/Commercial Negotiation Committee(CNC) of GRSE.
3. Bid with technical requirements and/or terms not acceptable to GRSE / Customers / External agency nominated, as applicable.
4. Bid received without qualification documents, where required as per the tender.
5. Bid not meeting the pre-qualification parameters / criteria stipulated in the Tender Enquiry.
6. Bid with validity expiry date shorter than that specified in the Tender Enquiry.
7. Bidders have indicated / attached / shown any price anywhere else other than as per provision in e-portal then offer will be treated as cancelled.
8. **M/s. Indian Institute of Technology, IIT Madras** who have not agreed for the fixed price till the validity of the tender or have quoted the variable price.

9. **M/s. Indian Institute of Technology, IIT Madras** not agreeing for furnishing of the required Security Deposit (SD).

ARTICLE 21 अनुच्छेद - 21: POST AWARD APLICABLE CLAUSES ठेका जारी करने के पश्चात लागू उपधारा:

i. Security Deposit प्रतिभूति जमा -

Non-interest-bearing security deposit of **5%** of total order value (inclusive of GST) is to be deposited in the manner elaborated at GRSE STAC at **Annexure-2**.

ii. Work Done Certificate (W.D.C.) कार्य पूर्ति प्रमाण-पत्र (डबल्यू.डी.सी) -

Work done certificate will be issued by DGM(FD)/ Manger (FD) or nominated Officer of CDO dept. based on the acceptance report as applicable. W.D.C. is to include whether work has been completed as per delivery schedule or with delay [in days/weeks specified therein]. Any recovery towards usage of GRSE resources is also to be indicated. WDC will be issued based on the following Stages of Job Completion:

Stage	Job Description
I	On submission of proof for completion of Model making along with all appendages
II	On Submission of final report for Resistance Model test

iii. Bill Submission बिल प्रस्तुति -

On obtaining WDC, bills are to be raised Stage wise. Bills are to be submitted considering the Checklist for Bill Submission at **Annexure 3** along with supporting document (Work Done Certificate Copy etc.) at the Bill Receiving Counters located at the respective unit of Company. Bill is to be submitted (in 03 copies) in sealed envelope super-scribing on the envelope the Purchase Order No., Vendor code, Bill / Invoice No., Name of person /employee to whom bill is addressed, for processing.

Note: - Transaction fee of Rs.500.00 for first return & Rs. 1000.00 for subsequent return of bill with inappropriate documents will be charged.

iv. Payment Terms भुगतान की शर्तें -

a. The Stage wise Certified Bill amount (with full GST) against actual Work Done will be paid within 30 days of receipt of Bill (in 03 Copies) duly certified by Bill Certifying Authority & supported with satisfactory Work Done Certificate. Recoverable from Contractor if any, is to be adjusted from respective Stage payments as per certification of Bill Certifying Authority. Stages of Payments will be as follows:

Stage	Job Description	Payment terms
I	On submission of proof for completion of Model making along with all appendages	30%
II	On Submission of final report for Resistance Model test	70%

b. Payment will be made on actual certification basis.

c. **Bill Certifying Authority:** GM(Design)/DGM(FD) or their nominated Officer.

v. **Liquidated Damages निर्णीत हर्जाना -**

The vendor will be liable to pay minimum Liquidated Damages @ ½ % per week or part thereof on the undelivered work subject to a maximum of 5 % of the value of the order for delayed part. The amount of L.D. may be adjusted or set-off against any sum payable to the Contractor under this Contract.

vi. **Risk Purchase जोखिम खरीद -**

In case the progress of work is not satisfactory and the contractor fails to maintain the schedule, GRSE reserves the right to get the work done by alternative source at the risk and cost of sub-contractor.

GRSE shall be at liberty to purchase/obtain the service from the alternative source as it deems fit, to make good such default and or in the event of the contract being terminated, the balance of the remaining service to be delivered there under. Any excess over the job price / service rates, paid and incurred by GRSE, as the case may be, over the contract price shall be recoverable from the firm. To make good the recoverable excess amount paid, GRSE shall be at liberty to invoke Bank Guarantee and/or with other available dues of the firm.

vii. **Fire & Safety Precautions अग्नि एवं संरक्षा सावधानियाँ: (for working inside GRSE)**

The Vendor/Contractor shall abide by the Safety regulations/rules of the GRSE as detailed in Fire & Safety Guidelines (please refer www.grse.in). You should take all safety precautions and provide adequate supervision & control for your workmen in order to carry out the job safely. In case of any violation of safety precaution and none using of safety equipment, Contractor shall be liable for a penalty which is detailed in Fire and safety Guideline. Penalty amount depends on the type and frequency of violation mentioned in the safety guideline and the same will be deducted from the defaulter's bill.

viii. **Mandatory use of ISI marked PPE by Contractor Employees:** The Contractor shall ensure the use of ISI marked PPE by their engaged Employees. An indicative list of ISI marked Personal Protective Equipment, is appended below for mandatory compliance by the vendors without any deviation:

LIST OF PPES

Sl. No.	Name of PPE	Standard
(a)	Safety Helmet	IS: 2925 / EN 397.
(b)	Safety Footwear	IS 15298 / EN ISO 20345
(c)	Safety Goggles	ANSI Z87.1 / EN166.
(d)	Ear Plug	IS: 9167/ EN 352
(e)	Hand Gloves	(i) IS 4770 for electrical work (ii) EN 420 for general requirement (iii) EN 388 for mechanical hazard (iv) IS:6994 / EN 407 for heat applications (gas cutting / welding).
(f)	Welding Fume Respirator & Dust mask	IS: 9473 / EN: 149
(g)	Double lanyard Safety Belt & harness, automatic fall arrestor	IS: 3521
(h)	Cotton Boiler Suit Cloth	IS: 177 - 1989 (Amended up to date), Variety 3

Note: Apart from the above-mentioned PPE, vendors may consider any other type of standardized PPE as per job requirement, in consultation with GRSE Safety Department.

ARTICLE 22 अनुच्छेद - 22: SUBMISSION OF BID बिड की पेशी:

1. Last date of submission of Bid / Date of opening of bid is indicated in Tender Document. Tender is liable to be rejected if all the requisite documents are not enclosed with the Part I, Techno-Commercial offer.
2. Date of opening of Part II offer i.e. Price Bid will be notified to all Techno-Commercially qualified bidders in due course after conclusion of TNC/CNC meetings and acceptance of Techno-Commercial offer. After opening of e-Price bids, the techno-commercially qualified bidders can view the System Generated Price Comparison Sheet from their own portal.
3. GRSE reserves the right to accept / reject any Tender in full or in part without assigning any reason.
4. 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 in STACs acceptance format matrix, it would be presumed that you have accepted all our terms & conditions as per GRSE tender until & unless deviation is specially mentioned in offer.

**Ashim Kumar Dey
SM(Contract)
Garden Reach Shipbuilders & Engineers Limited
61, Garden Reach Road, Kolkata – 700 024
Mobile: +91 75960 23717**

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test Annexure-1	Sheet 1 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

**STATEMENT OF REQUIREMENTS (SOR) FOR RESISTANCE MODEL TEST –
RESEARCH VESSEL (RV)**

1. **GENERAL.** GRSE has in-house developed a preliminary bare hull form for Research Vessel. Now there exists requirement to validate the same through Resistance Model testing. Further, the optimization/validation of hull form will have to be done with respect to Ship resistance of the Hull form provided by GRSE.

2. This statement of requirements (SOR) pertains to Hydrodynamic Model Tests to be conducted on the model of a new design ship. The particulars of the ship are placed at Appendix – A and general requirements governing the model tests and submission of results are placed at Appendix – B.

3. **DETERMINATION OF MODEL SCALE/SIZE:** A single ship model of optimum size with minimum viscosity scale effects with twin screw propulsion system is to be used for resistance tests.

Based on the finalized model dimensions, the drawings and photographs of the model used for the experimental test is to be given in the report.

CALIBRATION OF INSTRUMENT: As per the established procedure.

4. **Scope of WORK - Resistance Model test:** These tests are conducted to determine the total resistance of the ship. The sequence of tests and conditions to be tested are indicated below. A roughness correction factor needs to be applied for model to ship correlation as per ITTC conventions.

a. **Bare Hull Resistance Tests.** These tests are required to be undertaken for the bare hull one draught at Deep Displacement from 6 knots to 16 knots ship speed with 1 knot increment and accurately determine the form factor of the vessel.

b. **Appended Hull Resistance Tests.** Appended hull resistance tests are to be undertaken using the selected configuration of appendages like Skeg, Rudders , gondola etc. as obtained from CFD analysis. These tests are required

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test	Sheet 2 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

to be undertaken at one draught for speeds corresponding to those considered for bare hull test.

3.3.2 Presentation of Results. The test results should provide the following information in form of tabulated data and graphs both for model and scaled up for ship along with the correlation factor.

- (a) Plots of effective horsepower against ship's speed for all conditions for barehull.
- (b) Plots of effective horsepower against ship's speed for fully appended hull.
- (c) Videos and photographs of model at various test conditions.
- (d) Tabulated values of coefficient (C_f , C_r , C_a , form factor & C_t) for bare hull.
- (e) Tabulated values of coefficient (C_f , C_r , C_a , C_{app} , form factor & C_t) for fully appended hull.

5. Place of work: Department of Ocean Engineering, IIT Madras.

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test	Sheet 3 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

Appendix-A

1.1. **Description of the Vessel:** The main particulars of the ship are appended below:

Length overall (LOA)	89.50 M
Breadth Moulded on Main Deck (Bmld)	18.8 M
Design Draught (T)	6 M
Depth to main deck	9.80 M
Design Trim	Nil
Design Deep Displacement	5900 T
Max Speed at 5900 Tons Displacement (with Gondola attached)	14 knots at 90% MCR
Economical Speed	12 knots 3 Knots minimum sustained speed
Propulsion system	Twin screw Diesel-Electric propulsion 02 x propellers

1.2. **Propulsion System:** The propulsion system should consist of 2 x propeller arrangement, each shaft driven by one electric AC motors designed for marine propulsion which in turn powered by Diesel Generators.

1.3. **Appendages:** The various appendages like Bilge Keels, Skeg, Gondola, thrusters (Bow & Stern) shall be fitted.

Note : The vessel will mainly be operating in tropic and sub-tropic areas as well as Antarctic areas. The vessel's systems and equipment shall therefore be capable of operating constantly under the following environmental conditions:

1. Seawater temperature: -2°C to 32°C.
2. Minimum air temperature: -20°C
3. Maximum air temperature: +36°C at 100% air humidity.
4. Maximum air temperature: +40°C at 70% air humidity.

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test	Sheet 4 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

Appendix-B

GENERAL REQUIREMENT:

1.1. Required Inputs from GRSE: Test Agency shall indicate in their offer all necessary inputs required from GRSE for the proposed model tests.

1.2. Deliverables: Hull form & Resistance:

1.2.1. Testing Agency shall immediately intimate GRSE how the hull forms perform from resistance point of view. In case, any modification is recommended in any portion of the selected hull, detailed offset table along with drawing in AutoCAD **.dxf** format shall have to be forwarded by e-mail. Theoretical Speed-Power prediction shall also be intimated immediately by e-mail.

1.2.2. After completion of all theoretical analyses and tests, a soft copy of the draft of the formal report of the results of all tests shall be submitted to GRSE for their acceptance/comments. The said draft report shall be complete with photographs of tests, screenshots from software or digital files in ASCII format and discussion on the study/test results. On accord of acceptance/comments of the draft report by GRSE, final report shall be submitted in triplicate in hard copies along with the soft copy. All the soft copies of report, photographs and videos should be submitted in Flash drive or SSD.

1.3. Visit of Representatives of GRSE and Owner: GRSE and Owner of the vessels shall have the right to depute representatives to witness the tests in each phase.

1.4. Documentation: The final report in English Language should be complete in all respects and should include: -

1.4.1. Standard details of models of hull and the Propulsor and specific emphasis on any deviations from the Standard Acceptance Criteria as explained later. The reason for the same is to be provided and the corrections, if any' should be explained. Interpretations of test results and conclusions drawn based

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test	Sheet 5 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

on the previous test report experience of the basin is to be forwarded by the Testing Agency. Positive recommendations to improve performance based on existing data on similar ships/past experience, is to be indicated in the report.

1.4.2. Details of test facilities and details of limitations, if any. The corrections for the same are to be explained.

1.4.3. The details stating temperature, salinity, viscosity etc. of the Basin water be given and the effect of the same on the experiment be recorded. Procedure/rationale for undertaking uncertainty analysis and tank correlation factor used is to be clearly indicated.

1.4.4. Details of the instrumentation and limitations (if any) should be recorded.

1.4.5. Details of tests undertaken to be included and any deviation from the procedure explained in the document be recorded and the reason and corrections if any, be explained.

1.4.6. Observed readings and photographs.

1.4.7. At least one set of sample calculations for each type of test are to be provided.

1.4.8. Results in tabulated and graphical form as stated in latter chapters be provided. All results should be reported in SI units.1.4.10 Photographs and video films be provided as necessary.

1.4.11 The report of the model test should highlight, if any of the results appear to be significantly different from expected values and suggestions for appropriate remedial measures for correcting or improving the same should be indicated in the report.

1.4.12 The testing agency is to take prior concurrence from the customer on any matter where their standard procedures of tests differ from the specifications provided.

1.4.13 The firm is required to store the model without any cost implication for a minimum period six months from the date when the tests are finished and final report delivered. Additional tests, if required, would be indicated to the firm prior completion of storage period.

CDO, GRSE Ltd. Kolkata	Statement Of Requirement for Optimization of Hull form of Research Vessel (ORV) through Resistance Model Test	Sheet 6 of 6
SOR No: RN/FD/ RV/MT/001		Revision: NIL

Appendix-C

Model Preparation:

1. The design of the model should ensure geometric similarity to the actual design. In addition, it should also ensure similarity of various other properties which will be mentioned later. The model is to be constructed to Moulded dimensions as per ITTC requirements. The various material that can be used for model making are mentioned in the succeeding paragraphs.
2. **Acceptance Criteria-Hull Model for Resistance Test:**
 - 2.1. **Surface finish.** The model surface should be smooth and equivalent to that achieved with a 300 to 400 grit wet and dry paper.
 - 2.2. **Stations spacing.** The spacing and numbering of stations and waterlines should be properly defined.
 - 2.2.1. A ten-section system numbering from fwd. with station 0 at the FP is generally followed. The number of stations can also be 21 (20 equally sized intervals).
 - 2.2.2. Decimal fraction stations may be introduced at the ends as required (such as 9.5, 9.6, 9.7 etc.).
 - 2.2.3. Stations fwd. of the FP to be numbered negatively.
 - 2.3. **Waterlines.** Waterlines are identified as follows: -
 - 2.3.1. Waterlines should be spaced as required and identified by their height above the baseline.
 - 2.3.2. The baseline should be defined as per design.
 - 2.4. **Manufacturing Tolerances for Hull.** The basic requirements of the tolerances for the Hull model as per ITTC 7.5-01-01-01 to be followed.

GENERAL TERMS & CONDITIONS**1. PAYMENT TERMS (भुगतान की शर्तें):**

Payments shall be made stage wise as tabulated below:

Stage	Job Description	Payment terms
Resistance Model Test for Research Vessel		
I	On submission of proof for completion of Model making along with all appendages	30%
II	Submission of final report for Resistance Model test	70%

2. **WORK DONE CERTIFICATE(W.D.C.) (कार्य पूर्ति प्रमाण-पत्र (डबल्यू.डी.सी):** The Firm shall submit request for Work Done Certificate (WDC) as per stage wise at para 1 to the DGM(FD)/SM(FD)/MGR(FD) of CDO dept for certification. WDC shall be issued by the GRSE executive concerned in a time bound manner. Based on the WDC signed by CDO officer, the stage bill shall be certified for payment by GM(D) /DGM (FD).
3. **JOB STARTING DATE (कार्य प्रारम्भ तिथि):** The work must be started immediately after receipt of PO/LOI/LOA.
4. **JOB COMPLETION SCHEDULE (कार्य समापन अनुसूची):** Entire scope of Work to be completed within 05 weeks from the date of placement of PO/LOI/LOA.
5. GRSE reserves the right to accept / reject any Tender in full or in part without assigning any reason.
6. Conditional offer will not be generally accepted. Any specific condition, put forward by vendor may be accepted/rejected at the sole discretion of GRSE.
7. **INSPECTION AUTHORITY (गुणता आश्वासन प्राधिकारी):**
All work will be supervised/inspected by GRSE design personnel.

CHECK LIST FOR BILL SUBMISSION - for Service Contracts				
A.	GENERAL PARTICULARS: (to be checked and submitted by Contractor/Vendor)			
A.1	BTN (as per BTS System): -			
A.2	Invoice No and date / E-Invoice No. & Date (if applicable for the vendor) (Original & in triplicate)			
A.3	PO Number			
A.4	Name of Vendor			
A.5	Location of work:	MW / RBD/ FOJ/ TU / 61Park/Vendor's premises		
I. For RA Bill (Running/Progressive bill) (Put ✓ Mark)		YES	NO	NA
A.6	PO Number and date verified with Invoice:			
A.7	Vendor Name & Address in Invoice verified with Purchase Order:			
A.8	Vendor Code as in PO verified with Invoice:			
A.9	Original certified WDC enclosed:			
A.10	Whether WDC is Certified by the Authorized Person as per PO / SOTR with Rubber Stamp			
A.12	HSN/SAC code is as per PO			
A.13	GSTIN No. is as per PO			
A.14	GST % is as per PO			
A.15	Security Deposit (SD) submitted as per PO			
A.16	PBG of equivalent amount submitted, as per PO			
A.17	Compliance of Statutory Liabilities of labour as per PO			
II. Applicable for Final/Balance Bill (Put ✓ Mark)				
A.20	Certified Job Completion Certificate (JCC) enclosed			
A.21	MRS as per PO terms enclosed (If applicable)			
A.22	Guarantee Period (GP) expired as per PO term			
A.23	PBG of equivalent amount submitted, if GP is not over (If Yes, copy to enclose with the bill)			

Signature of Vendor's representative
with Seal/Stamp

For GRSE Use Only				
B.	To be checked and verified by Bill certifying authority (Put ✓ Mark)	YES	NO	NA
B.1	Whether Bill has been forwarded through BTS			
B.2	Whether WDC is Certified by the Authorized Person as per PO / SOTR with Rubber Stamp			
B.3	Job starting & Completion Date (Schedule & Actual) indicated in WDC			
B.4	Certification of Penalty/ Recovery from bill indicated in WDC, if applicable			
B.5	Whether Bill is Certified by the Authorized Person as per PO / SOTR with Rubber Stamp			
B.6	Certification of Penalty/ Recovery from bill as per WDC, if applicable			
B.7	Service Entry Sheet (SES)/GR in line with WDC, PO & Invoice			
	For Final/Balance Bill (Put ✓ Mark)			
B.8	Certified MRS copy as per PO terms enclosed (If applicable)			
B.9	Guarantee Period (GP) expired as per PO term and JCC			
B.10	PBG copy of equivalent amount till GP validity enclosed (if GP is not over)			

Signature of GRSE Bill Certifying Authority
with Designation
