



ALCOCK ASHDOWN (GUJARAT) LTD.
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Tender closes on Date: August 20, 2007

Tender No.: AAGL/PP&C/SV/1149

Date: July 24, 2007

M/s.

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Tender for complete Turnkey Electrical Contract for Design, Supply, Installation Integration and Commissioning / Trials onboard 6 Nos. Catamaran type Survey Vessel for Indian Navy our Yard No. 257-262 at our Bhavnagar / Chanch Shipyard

Dear Sir,

You are requested to submit your lowest quotation for tender mentioned “Electrical Contract for Design, Supply, Installation Integration and Commissioning / Trials onboard 6 Nos. Catamaran type Survey Vessels for Indian Navy, Yard No. 257-262” as per all the terms, conditions and requirements in this tender and its attachments.

Name of work	Probable estimated value of tendered contract per vessel	EMD	Completion period	Last date of issue of tender	Last date of submission of tender and date of opening of technical bids	Tender fee
Complete Turnkey Electrical Contract for Design, Supply, Installation Integration and Commissioning / Trials onboard 6 Nos. Catamaran type Survey Vessel for Indian Navy, Yard No. 257-262 at AAGL Bhavnagar /	Rs. 6 crores per vessel (Approx.)	Rs. 2000000/- per vessel	10 months for first vessel and subsequent vessel at interval of 3 months each	28/07/2007	20/08/2007	Rs. 5000/-

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Chanch Shipyard						
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[A] **Minimum eligibility criteria for tenderers**

Only those, satisfying following criteria and submitting the documents of the same with the technical bid shall be eligible to participate in the subject tender.

- [i] Income tax clearance certificate OR copy of Income tax returns of last 3 years along with audited statement of accounts by Chartered Accountant.
- [ii] Bank solvency certificate of at least 50% of the estimated tendered contract value.

[B] **Sale and submission of tender documents**

- [i] Eligible vendor / contractor may peruse the tender documents and obtain the same from the office of AAGL at Bhavnagar on all working days OR may download from our website www.alcockshipyard.com on payment of non refundable tender fees as mentioned, by demand draft in favour of Alcock Ashdown (Gujarat) Ltd., payable at Bhavnagar, in person or through authorized representative of the bidder.
- [ii] Eligible vendors may submit their bids for six survey vessels. All the jobs / suppliers specified in the tender are interrelated to one another and is a part of one complete job, hence bidders to submit their offers for complete turnkey contract as specified in the tender. All the jobs shall commence in coordination of each other.
- [iii] Earnest money deposit should be submitted with the technical bid. Duly filled tender documents along with EMD and all other documents required to be submitted by the bidders are to be submitted at following address.

The Managing Director
Alcock Ashdown (Gujarat) Ltd.
Ramsar Works, Old Port
Bhavnagar 364 001
Gujarat – India

- [iv] The completed tender documents will be received in the office of AAGL up to 14:30 hours on the date mentioned in the TENDER NOTICE.

[C] **Qualification**

The bidder shall have required experience, qualification and exposure to undertake and execute the turnkey electrification and integration work on Naval vessels, which shall be judged from the point of view of following factors.

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		Marks
1.0	Experience including Naval vessel job exposure	20
2.0	Financial soundness and capability	20
3.0	Strength of technical & supervising manpower	20
4.0	Strategy for total integration job and work execution	20
5.0	Capability to mobilize the resources	10
6.0	Design and equipment / material supply capability through own [in house] resources and technical collaboration	10
		100

The bidder must submit sufficient details and documentary proofs in support of above mentioned qualifying factors / criteria. In absence or insufficiency of the same the bid may be disqualified.

- [D] Management of Alcock Ashdown (Gujarat) Ltd., reserves the right to accept or reject any or all tender bids in part or full or to cancel the issue of tender documents without assigning any reason whatsoever.
- [E] Interested bidders are required to carefully go through and study the complete tender documents and shall submit their offers in two separate sealed envelopes super scribed as “Technical Bid” on envelop no. 1 and “Price Bid” on envelop no. 2.
- [F] **Technical Bid** should be comprising of following;
- [i] Copy of the complete tender documents dully filled [except Price Bid] as specified / required and stamped and signed by the bidder on each and every page of the tender document including all its annexures as a token of their acceptance to all the terms, conditions and requirements as specified in the subject tender.
 - [ii] Technical details, list of spares and tools as specified. Other informations as specified and required to be submitted with the tender and the documents in support of your technical and financial competence / soundness and details of resources and technical back up available with bidder.
 - [iii] EMD by demand draft or pay order of any nationalized bank payable at Bhavnagar.
- [G] **Price Bid** shall comprise of details of price duly filled up by bidder as specified and bifurcated under various category of tendered scope of work and supply items in Price Bid format “Annexure-B” duly stamped and signed by the bidder.

The Price Bid of technically qualified bidders will only be opened subsequently. AAGL reserves the rights for accepting or rejecting any or all price bids received without assigning any reason for the same.

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The offers should be delivered and submitted by speed post / courier or in person, on or before closing date and time of the tender. And to be deposited in the sealed tender notice box kept in AAGL office for the purpose.

[H] **General Terms & Conditions for lumpsum Contract for Design, Supply, Installation, Integration and Commissioning / Trials of electrical systems and equipments:**

- 1) (a) Temporary scaffolding if required shall be arranged by the contractor.
(b) No permanent scaffolding shall be allowed to be put inside the hull.
- 2) The contractor has to adhere to the instructions related to the sequence / method of work given by us time to time. Any change in above shall be discussed mutually & implemented only on agreement.
- 3) The contractor must possess sufficient experience of design, supply, installation, integration and commissioning / trials of marine electrical equipments and systems onboard ships. Contractor should also have knowledge of all general and special requirements as per Indian Navy standards. The bidders to submit details of similar kind of jobs executed in past to get bonafied.
- 4) Specifications, design, drawings and calculations to be prepared by the contractor and to be submitted for the scrutiny, comments and approval of the yard, classification society, statutory authority and IHQ-MOD[N] of Indian Navy as applicable.

Electrical equipments / components / items / materials should be selected from the nominated list of manufacturer / vendor as listed below and to comply with the applicable specifications / type as specified against each equipment / item / material in the following list.

MANUFACTURER / VENDOR LIST (ELECTRICAL)

No.	Equipment Description	Applicable Spec/ Type	Make
1	Main Switch Board	EED-Q-264/Def Stan-02-530	M/s GEPC, Bangalore GE Consumer & Industrial. Plot No 42/18 & 45/14 Electronic City Phase II Bangalore -560100 M/S L&T Mumbai Ballard Estate Mumbai-400001 Fax No 022-28581070/28581076 M/s Marine Electrical, B-1, Udyog Sadan-3 MIDC, Marol Industrial Area, Andheri (E) Mumbai- 400093

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No.	Equipment Description	Applicable Spec/ Type	Make
2.	Motor	EED-Q-071(R2)/	<p>M/s Bharat Bijlee, Kolkata</p> <p>M/s Polyphase Motors 702, Gidc Makarpura, Varodara-390010 Tel-0265 2645076 Fax. 0265 2638176</p> <p>M/s GEC</p> <p>M/s Narhari (Engineering Works) 443, Lakshmi Plaza Lakshmi Industrial Estate, New Link Road, Andheri (W), Mumbai 400053 Tel: 022 56920933 Fax 91 22 56920934</p> <p>M/s Siemens Ltd. 130, Pandurang Budhkar Marg., Worli, Mumbai-400018 Tel 022 2498 7000-005 Fax 022 2498 7500</p> <p>M/s Alstom</p>
3	Starter / Control Panel	EED-Q/071(R2)/ Def Stan-02-636	<p>M/s Siemens Ltd. 130, Pandurang Budhkar Marg, Worli, Mumbai-400018 Tel 022 2498 7000-005 Fax 022 2498 7500</p> <p>M/s GEPC, Bangalore GE Consumer & Industrial. Plot No 42/18 45/14 Electronic City Phase II Bangalore - 560100</p> <p>M/S L&T Mumbai Ballard Estate Mumbai-400001 Fax No 022-28581070/28581076</p>
4.	Transformer	Def Stan-02-535	<p>M/s Static Transformer G-4,AD,Industrial Estate, Pologround, Indore, MP-452016 TELE.No 0731-2420793 0731-2420859 Fax No.0091-0731-420793</p> <p>M/s EMF 36/2-B Momipur Road, Kolkata 700023</p> <p>M/s AEC Controls Mcg. Co., Room No 32 Mangal Bhawan, Mangal Wadi. J.S Road Mumbai.40004.</p> <p>M/s Radiant Electronics P-22 Kasba Industrial Estate, Phase-I Kolkata – 700013</p>
5.	Transformers Rectifier / Battery Charger	Def Stan-02-536 & 337	<p>M/s Fabricons 74, Marol Co.OP Indi.Estate M.Vasanji Road, Sakinaka Mumbai.400059</p>

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No.	Equipment Description	Applicable Spec/ Type	Make
			<p>M/s Radiant, Electronics P-22 Kasba Industrial Estate, Phase-I Kolkata 700013</p> <p>M/s Static Transformer G-4,AD,Industrial Estate, Pologround,Indore, MP-452016 TELE.No 0731-2420793 / 0859 Fax No.0091-0731-420793</p> <p>M/s AIM Engineering Industries D-4 Behala Industrial Estate 620 DH Road -700034 Kolkata</p> <p>M/s Neo Power,Electronics & Project Pvt. Ltd 22, PN Kothari Ind: Estate LBS Marg, Bhandup (W) Mumbai 400 059</p>
6.	Distribution box / Navigation Light Panel / Test Panel		<p>M/s AIM Engineering Industries D-4 Behala Industrial Estate 620 D.H Road., Kolkata 700034</p> <p>M/s Arvind Industries Moti Baug Soin,Trambay Road, Chembaur, Mumbai 0400071 Tele. No. 022-25952417</p> <p>M/s AEC Controls Mfg. Co., Room No 32 Mangal Bhawan, Mangal Wadi. J.S Road, Mumbai.- 400004</p>
7.	Light Fittings	EED-Q-261/266	<p>M/s Manish Industries 133 Beliaghnta Road Kolkata - 700015</p> <p>M/s Isaac Engineering Works 27/1/6, Ddr, Sureshchandra Banrjee Road, Kolkata - 700010</p> <p>M/s Ray Enterprises 18,Indi. Estate Ambla Cantt -133001.</p>
8.	Fan	300/400 mm	<p>M/s. Crompton Greaves, Mumbai</p> <p>M/s. Remi, Kolkatta</p> <p>M/s. Almonard</p>
9.	Plug, Socket	Naval Patternised	<p>M/s Ray Enterprises 18,Indi. Estate Ambla Cantt -133001.</p> <p>M/s Anchor</p> <p>M/s Kaycee Industries Ltd., Mumbai</p> <p>M/s Isaac Engineering Works 27/1/6, Ddr, Sureshchandra Banrjee Road, Kolkata – 700010</p> <p>M/s Manish Industries</p>

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No.	Equipment Description	Applicable Spec/ Type	Make
			133 Beliaghnta Road Kolkata – 700015
10.	Navigation Lights	Standard	<p>M/s Arvind Industries, Moti Baug Soin, Trambay Road, Chembaur, Mumbai – 0400071 Tele: 022-25952417</p> <p>M/s Ray Enterprises 18, Indi. Estate, Ambla Cantt -133001</p> <p>M/s Isaac Engineering Works 27/1/6, Ddr, Sureshchandra Banrjee Road, Kolkata – 700010</p> <p>M/s Manish Industries 133 Beliaghnta Road Kolkata – 700015</p>
11.	Shore Supply Box	As required	<p>M/s GEPC, Bangalore GE Consumer & industrial. Plot No 42/18 45/14 Electronic City Phase II Bangalore - 560100</p> <p>M/S L&T Mumbai Ballard Estate Mumbai-400001 Fax No 022-28581070/28581076</p> <p>M/s Siemens Ltd. 130, Pandurang Budhkar Marg. Worli, Mumbai-400018 Tel 022 2498 7000-005 Fax 022 2498 7500</p>
12.	Cables	Def-stan-02-518 LFH GRADE	<p>M/s Universal Cables Ltd, New Delhi</p> <p>M/s Uniflex Cables, Ltd. 11 Joawar Bhawan 3rd Floor 93 M, Karve Road Marine Lines, Mumbai- 400020</p> <p>M/s NICCO Corporation, New Delhi M/s KEI Industries, New Delhi M/s Indicom cables Pvt. Ltd. Sikandrabad(UP)</p>
13	Video Distribution System		<p>M/s Naval Electronics, UK Naval Electronics AB Hojdradergaton 18, SE – 2/2 39 Matmo Sweden Fax – 4640187413</p> <p>M/s Shyam Communication Ltd.</p>
14.	Automatic Change Over Switch		<p>M/S L&T Mumbai Ballard Estate Mumbai-400001 Fax No 022-28581070/28581076</p> <p>M/s GEPC, Bangalore GE Consumer & industrial.</p>

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No.	Equipment Description	Applicable Spec/ Type	Make
			Plot No 42/18 45/14 Electronic City Phase II Bangalore - 560100 M/s Siemens Ltd. 130, Pandurang Budhkar Marg. Worli, Mumbai-400018 Tel 022 2498 7000-005 Fax 022 2498 7500
15.	Lead Acid Type Batteries		M/s Amara Raja Batteries B83 Ground Floor, PUNCHSEEL VIHAR DELHI M/s Amco Kakad Chambers, 132, Dr. Annie Bseant Road, Mumbai – 400018 M/s Exide Kunjur Division, Kunjur Village, (Electrical) Mumbai M/s Bharat Batteries, Kolkata
16.	Recreation TV/VCR/CD player/ DVD player		COTS (COTS policy promulgated by Indian Navy vide Memo 2/98 to be adopted)
17.	Galley Equipment a) Cooking Range b) Hot Water Boiler c) Rice Cooker	As required	M/s Kantilal Chunilal & Sons Appliance P. Ltd. 3, Jawahar Road, Post Bag No. 2, Udhana Surat – 394210 Gujarat M/s Sushma & Co.,(Elect) 17B, Ghat Koper Industrial Estate LBS Marg, Ghatkoper West, Mumbai

The bidders are required to submit the letter of confirmation clearly accepting the above list and giving confirmation towards supply of listed items only from the nominated vendor applicable and complying to the respective specification / type / make specified in the list.

- 5) All equipments, panel boards, cable trays / hangers, cables, fittings etc. have to be installed as per approved design / drawings, instructions and standard marine practice. However special considerations to be given in the design layout and installation accepting the fact that the vessel is having a Catamaran hull form of steel material and the material of construction for the superstructure is aluminium. Necessary trimming, cutting, drilling, grinding etc. as required during the electrical installation work onboard vessel/s shall be done by the contractor. All the consumables like electrodes, gas, grinding disc, ties, lugs, insulation tapes, sleeves, cutting hoses / torch, welding cables, tools, tackles etc are to be arranged by the contractor at his cost. All normal and special tools and instruments required for the job are required to be arranged by the contractor.

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- 6) The work is to be executed at our yard site at Bhavnagar and Chanch. Lodging, Boarding & Transportation of their labours and staff shall be arranged by the contractor at his cost.
- 7) Contractor has to adhere to the instructions given to him time to time and also to follow the approved drawings and instructions strictly. Any rejection/rectification shall be attended by the contractor at his cost.
- 8) The supply, installation and commissioning period is taken as 8 months (2 months for supply and 6 months for installation and commissioning) from the placement of order. A schedule of the work is required to be submit by vendor to the yard, the same to be inline with the overall build schedule decided by the yard.
- 9) The responsibility for proper storage and preservation of the equipments and material supplied for the electrification shall be under vendor's scope i.e. proper rain proof storage room, storekeeper, watchmen etc. are to be arranged by the vendor / contractor. Insurance against fire, theft and other damages is to be arranged. Handling of insurance claims, if any, arising out of transport damages are also to be organized. Space shall be allotted by the yard for storage.
- 10) The work will be inspected by authorized representative of the yard, in stages and also by the inspecting authority of Indian Navy, class and statutory authorities as may be applicable. Any loss or wastage of material will attract heavy penalty. Any slippage in time schedule for completion of the work will also attract penalty.
- 11) Only approved welders shall be deployed for the critical structural welding of any electrification work related items / jobs.
- 12) Any damage to nearby areas/structures due to negligence in carrying out electrical system installation work shall be made good by the contractor at his cost. Damaged painting shall be touched up by the contractor in case of the hot work done by the contractor after the painting of subject area.
- 13) No labour idle time shall be paid by the company [AAGL] to the contractor.
- 14) The contractor will complete the work as per the schedule and instructions given to him time to time. In case if he fails to do so, the company [AAGL] will get the work done with the help of some other resources and if in doing so, the company [AAGL] suffers any losses, the same will be deducted from contractor's bills or recovered suitably.
- 15) The contractor shall not assign or sublet the whole or any part of the work without company's [AAGL] consent in writing. Even if any permission to assign or sublet any part of the work has been granted, AAGL shall have no obligation to assignee and the contractor shall be fully responsible to the company [AAGL] for satisfactory execution and completion of the work.

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- 16) The contractor will be fully responsible for maintenance of records and other liabilities under the provision of various labour legislations. The contractor will be abide by the terms and conditions of contracts labour (Regulation and Abolition) Act and the rules framed there under.
- 17) Workmen of the contractor will be governed by the rules and regulations of our shipyard, while they are at our work. The contractor shall be responsible for complying with all laws, regulations, notifications, etc of the Central, State Government and other local authorities as applicable time to time.
- 18) Price quoted must confirm to the supply of equipments/material and jobs specified in the tender. The price must be shown legibly in ink or type written and to be filled up against each supply / job / activity specified in "Annexure-B" and same be stamped and signed by the bidder and to be submitted in separate sealed cover.
- 19) The acceptance of the tender in whole or in part will be entirely at the desecration of the management of the company [AAGL] or their authorized representative.
- 20) The tender may be sent through Courier/Regd. Post/Hand Delivery and to reach our Bhavnagar office before closing date and time within office hours. Two bid system [Technical Bid and Price Bid] is adopted for the tender. Hence Technical Bids of all the bidders shall be opened first and will be scrutinized for the compliance of all the requirements specified for the subject tender. Based on the technical scrutiny of the tenders preliminary short listed bidders may be invited for the TNC. The bidders confirming / complying all the technical and techno commercial requirements shall only be considered qualified technically.
- 21) Any work / activity / equipment / material not specified in this tender, however necessary for the tendered jobs, the same to be considered by the contractor under his standard scope at no extra cost to the company [AAGL].
- 22) Price quoted for the turnkey job to be fixed and firm.
- 23) The Contractor will exercise due control over his staff & workmen as well as staff & workmen of their subcontractors if any, Company shall have the right (incase any of Contractor's staff & workman or agency being incompetent or ill mannered) to ask the Contractor to remove such staff / workmen or agency from the site which shall be complied with by them with immediate effect.
- 24) The Contractor will also be responsible for cleanliness of related work area and for safe custody, storage and preservation of all the equipments, machinery, material required for tendered job at proper place assigned by the company. The Contractor will be responsible for planning and interaction of tools, tackles

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and material handing for the job assigned to them. The goods under the custody of contractor will be treated as fully covered by him for any risk or loss due to theft, short or damage due to negligence on their part.

- 25) The Contractor will be responsible for providing compensation to his employees as per the governing Act, and medical aid due to any injury or accident. The Contractor should also maintain records as per contract labour [Regulations and Abolition] Act 1970.
- 26) The contractor will observe all the rules & regulations connected with safety of all his workers and staff. Contractor's workmen or staff will be trained by them from safety point of view. And they shall observe the safety regulations strictly while on work and on work site.
- 27) The contractor will comply with the provisions of workman's compensation act & arrange for their employee's liability insurance and any other insurance required under law & regulation. In addition Contractor should also cover their tools, tackles, equipments, staff and also their subcontractor's staff and workmen if any, by suitable insurance. The Contractor should also cover third party risk under insurance.
- 28) The contractor should register his firm with the office of the labour Commissioner from the respective jurisdiction in relation with the job site/s for getting labour license.

The contractor will have to comply with all the provisions under the various labour laws, which will be applicable to them.

Limitations of contractor's liabilities on the company [AAGL]:

- 1) Any consequential or indirect losses.
- 2) Any claim made against the company except as provided in this order.
- 3) Any damage/injury from acts or omissions from our employees or agents or others.

The contractor shall abide by the existing industrial laws as applicable from time to time to their firm & persons working for them at our site/s.

- 1) Central labour (Registration & abolition) act 1970 and Rules there under.
- 2) Payment of wages Act 1936 and Rules there under.
- 3) Minimum wages Act 1948 and Rules there under.
- 4) Industrial dispute Act 1947 and the amendment thereof.
- 5) Workman compensation Act 1923.
- 6) Factory Act 1948 & Rules there under.
- 7) Payment of bonus Act 1965.
- 8) Payment of Gratuity Act 1972.
- 9) The contractor shall extend provident fund benefit to their eligible

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employees as per the provisions of employee's provident fund and miscellaneous provisions Act 1952 and amendments there after.

The documentary proof, in the form of challan, receipt and returns as may be applicable in respect of their firm and all eligible employees, should be produced for verification as and when asked by the company [AAGL].

The contractor will be responsible for the Security / Safety of the equipments used by them at site.

29) The contractor will be completing the work as per the schedule given by the company [AAGL]. Any delay will attract a penalty of 1% per month up to the maximum of 5% of the total contract value.

30) All the taxes & levies as applicable to their contract by local agencies, State & Central Govt. Authorities shall be borne by the contractor.

TDS as applicable shall be deducted from the each payment made to the Contractor.

31) The workmanship of installation of complete electrification work carried out by the Contractor will be guaranteed by the contractor for twelve months from the date of delivery of the respective vessel to the Indian Navy at contractors cost.

32) **TERMS OF PAYMENT**

Payments shall be made as follows:

For Equipment: 100% of the price of equipment and material individually after 30 days of receipt of the equipment/material in yard.

For Installation: The Contractor will produce progressive bills attached with certificates duly certified by competent authority of the company [AAGL].

The payment shall be proportionately released within 30 days of presentation of the bills attached with certificates duly certified by competent authority.

The Contractor will produce their bills on monthly basis. We shall retain 10% of the bill amount from each bill on account of performance guarantee of the work carried out by the Contractor.

The payment against each monthly Bill shall be released based on the assessment / measurement of the physical work completed by the Contractor.

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Work to be commenced and completed as per the available work front and material and payments shall be released accordingly.

On successful completion of the commissioning, test, trials and certification of electrification work of the subject vessel, the Contractor may put forward their claim towards release of 10% of bill amount retained on account of performance guarantee from each running bills, against which contractor will have to give virtual work completion certificate issued by competent authority of the company [AAGL] and performance bank guarantee of equal amount valid till end of the guarantee period and the guarantee obligations.

- 33) The supply of equipments / material / items and work shall be subjected to the inspection by our Q.C. Department and approval of classification society / MMD / Indian Navy as applicable. Any recommendation given by the said authorities for the supplies, work and workmanship shall be made good by the Contractor without any extra cost implications to the Company [AAGL].
- 34) Any deviation what so ever to all the terms, conditions and requirements of the subject tender and any additional condition from the Contractor will not be accepted by the company [AAGL].
- 35) Tender to be submitted in the two separate sealed covers, clearly titled as "Technical bid for Design, Supply, Installation, Integration and Commissioning / Trials of electrical systems and equipments for Indian Navy Survey Vessels, Yard No. 257-262" and "Price bid for Design, Supply, Installation, Integration and Commissioning / Trials of electrical systems and equipments for Indian Navy Survey Vessels, Yard No. 257-262" respectively.

Each and every page of this tender document including "Annexure-A" and all Annexures ["Annexure A-1 to A-22"] of the technical bid duly accepted as per requirements specified and "Annexure-B" [**un-priced**] containing **blank** price bid format to be stamped and signed by the bidders as a token of acceptance by them to all the job requirements, terms and conditions of the subject tender and to be submitted in the sealed "Technical Bid". Whereas "Annexure-B" of price bid duly filled with the price by the bidder, stamped and signed, to be submitted in separate sealed price bid cover.

Preliminary GA plan of the vessel, specification, preliminary single line diagrams and preliminary main and emergency electrical load analysis of the vessel is attached herewith. Single line diagrams and load analysis are on preliminary basis and provided as a reference only for the bidders to submit their offers. However, the final design / drawings / single line diagrams and calculations etc. are to be prepared by the successful bidder under his scope of design work and on the placement of the order, same is required to be submitted by them as per schedule, for the approval of yard / Indian Navy / classification society / statutory authority as applicable. Comments / recommendations given by the all above are to be complied and design / drawings / calculations are to be corrected and

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updated accordingly and to be resubmitted by the contractor / vendor for the final approval of all concern only. Finally approved design / drawings / technical documents are to be followed by the vendor for the scope of supply and Installation work.

- 36) Survey / inspection charges as applicable and required to be paid to the class / statutory authority during the construction of the vessel at our yards shall be paid by us. Also the charges for the approval of the drawings and design of the vessel and its installation jobs shall be paid by yard.

However, the classification society and statutory authority charges / fees related to all supplied items under the scope of the vendor including its design approval, inspection, testing and certification etc. to be paid by vendor and their offer to be submitted accordingly.

- 37) Tender documents are mainly divided in to two parts. As a part of “Technical Bid”, details of all the requirements and total scope for turnkey electrical contract and reference drawing / technical informations are attached to this tender document as “Annexure-A” and “Annexure: A-1 to Annexure: A-22”.

“Price Bid” format is attached as “Annexure-B”.

Authorized Signatory
Alcock Ashdown (Gujarat) Ltd.



LIST OF ATTACHMENTS TO THE TENDER

COMPLETE TURNKEY ELECTRICAL CONTRACT FOR DESIGN, SUPPLY, INSTALLATION, INTEGRATION AND COMMISSIONING / TRIALS ONBOARD SIX [6] NOS. CATAMARAN SURVEY VESSEL FOR INDIAN NAVY, YARD NO. 257-262 AT AAGL BHAVNAGAR / CHANCH SHIPYARD

No.	Part of Tender	Attachment No.	Title	Page Nos.
1	Technical Bid	Annexure: A	Details for the electrical contract work	
1.1		Annexure: A-1	General requirements	
1.2		Annexure: A-2	Technical specifications for main switch board	
1.3		Annexure: A-3	Technical specifications for group starter panel no. 1 and 2	
1.4		Annexure: A-4	Technical specifications for ventilation group starter panel no. 1, 2 and 3	
1.5		Annexure: A-5	Technical specifications for power distribution board no. 1 to 5	
1.6		Annexure: A-6	Technical specifications for shore connection box	
1.7		Annexure: A-7	Technical specifications for emergency switch board	
1.8		Annexure: A-8	Technical specifications for navigation aid system distribution panel	
1.9		Annexure: A-9	Technical specifications for lighting distribution boards	
1.10		Annexure: A-10	Technical specifications for deck light / flood light / search light distribution board panel [230 V AC]	
1.11		Annexure: A-11	Technical specifications for emergency lighting distribution board 230 V AC	
1.12		Annexure: A-12	Technical specifications for emergency transient lighting, GMDSS / radio equipment and other 24 V DC consumers distribution board [24 V DC]	
1.13		Annexure: A-13	Technical specifications for battery charging panel [TRU] [24 V DC]	
1.14		Annexure: A-14	Technical specifications for navigation lighting panel [24 V DC]	
1.15	Annexure: A-15	Technical specifications for navigation lighting panel [230 V AC]		

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No.	Part of Tender	Attachment No.	Title	Page Nos.
1.16		Annexure: A-16	Technical specifications for group starter panel no. 3 [for engine room equipments only fed from emergency service power]	
1.17		Annexure: A-17	Technical specifications for emergency transformer fuse link box	
1.18		Annexure: A-18	Technical specifications for main transformer and manual changeover switch	
1.19		Annexure: A-19	Technical specifications for emergency transformer	
1.20		Annexure: A-20	List of other equipments / items to be supplied / installed / integrated / commissioned	
1.21		Annexure: A-21	List of other machinery, equipments, systems supplied by other vendors and required to be installed / integrated / commissioned as applicable by the electrical turnkey job contractor	
1.22		Annexure: A-22	Set of documents for the reference of the bidders, comprising following; [a] Preliminary "General Arrangement Plan" of 45 meter Catamaran type Survey Vessel [b] Set of preliminary "Electrical System Single Line Diagram" [c] Preliminary "Electrical Load Analysis" [for main DGs] [d] Preliminary "Emergency Electrical Load Analysis" [for emergency DG] [e] Tentative "Electrical Cable List" [f] List of facilities to be provided by the yard	
2	Price Bid	Annexure: B	Price bid format	

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ANNEXURE – A

TECHNICAL BID

DETAILS FOR THE ELECTRICAL CONTRACT WORK

Six Nos. Catamaran type Survey Vessels for Indian Navy, Yard Nos. 257-262

Scope of Supply and Work and Requirements to be confirmed and complied as follows:

1. Supply, installation, integration and commissioning / trials / certification of electrical systems / equipments / material as listed in the enclosed Annexures which includes:
 - a) Preparation of seats / mounting brackets for the equipments, fittings, accessories etc. as applicable.
 - b) Welding of seats / brackets to hull / Ship's structure.
 - c) Shifting, positioning and Bolting / Installation of the equipments, fittings, accessories etc. to seat / brackets including drilling etc.
2. Supply and Laying of cable trays/hangers made of perforated aluminium alloy material which also includes fabrication, welding of brackets etc.
3. Supply and installation of all lighting fixtures, switches, receptacles etc. on the vessel. Including all type of light fittings and cable laying with its connections.
4. Supply and Installation of pipes / conduites and pipe fittings including clamping / securing arrangement wherever required for cable protection especially below chequered plate in engine room / machinery spaces or on weather decks.
5. Fabrication and fixing including cutting and welding of bulkhead/deck water tight and non water tight cable glands for passing the cables. Watertight multi cable transient [MCT], deck tubes to be used to maintain the watertightness meeting requirements as stipulated for Naval vessels. Contractor also to ensure provision of suitable glands for all the equipments where the cable entry connections are required.
6. Supply and Laying of cables on cable trays/hangers including dressing and clamping of cables in trays/hangers.
7. Supply and Installation of sheet metal protective covers wherever required especially where cables are coming out of the openings on decks.
8. Labeling of cables at either ends before termination.
9. Glanding and termination of cables which includes dressing of cores, ferruling,

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- crimping of proper size of lugs, etc.
10. Carrying out pre-commissioning test and submitting the record to the yard / Indian Navy / class / statutory authority as applicable.
 11. Commissioning of all the installations and electrical systems to the satisfaction of yard / Indian Navy / surveyor of classification society / statutory authority.
 12. All the consumables required for fabrication work like cutting gases, electrodes, grinding disc, drill bits and tools / tackles like drill machine, crimping tools, grinding machine, cutting hoses, welding cables, pulley blocks etc are to be arranged by the contractor at his cost. PVC ties, insulation type cable lugs, binding wires, approved cable gland sealing compound, insulating material like PVC tape, sleeve etc shall also be arranged by the contractor at his cost.
 13. The complete cable laying and cable end connection activity consists of:
 - A. Main power cable laying from DG set to main switch board for each of the DG sets.
 - B. Complete cable related to Main DG set Engines and Emergency DG set engine instrumentation and safety system.
 - C. Complete power cable laying, remote start-stop cable and emergency stop cable laying for all the electrical pumps and ventilation fans.
 - D. Complete power cable laying including its main feeders, control/starter panels and master controllers fitment for deck equipments.
 - E. Complete power cable laying of equipments to be installed in the galley/pantry, laundry and entertainment equipments.
 - F. Cable laying for complete ship's accommodation lighting arrangement for all the compartments, machinery spaces, officers, crew's and officers accommodation areas and all the decks etc.
 - G. Complete cable laying for the searchlights and flood lights.
 - H. Cables for communication and navigation equipments and its control and power supply units.
 14. On completion of successful cable laying activity and installation of panel boards, transformers etc. as specified and the end connection/final termination activity to be commenced, which has to be followed by below listed procedures:
 - A. Proper bending as per bending radius requirements of classification society and fixing of each cable to be connected in specific panel board, transformer, D.G. Sets etc.

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- B. Preparation of gland holes for each cable entry according to type and size of the cable.
 - C. Proper cable gland filling / sealing as applicable using approved sealing compound ensuring water tightness and fire safety as per classification / statutory and Indian Navy requirements.
 - D. Each cable to be prepared for end connection by carefully removing the outer surface and outer armoring for final connection inside the panel board and other applicable equipment / machinery.
 - E. Solder less type lugs of appropriate type and size for each core of the cable with relevant ferrule marking to be crimped and fitted at specific end terminal point provided in the panel board and other applicable equipment / machinery.
 - F. All the separated cores of each cable to be properly dressed up inside the panel board and other applicable equipment / machinery.
15. Over and above the installation work of panel boards, the other components and control panel supplied with other machinery/equipments like control panels, electric motors, controls of motors, choke and starter supplied with lights, battery boxes and batteries etc. are to be installed, integrated and commissioned by the contractor. Following jobs to be carried out as per standard marine practice.
- A. Sealing of all the goosenecks and other weather exposed glands for deck machineries.
 - B. Proper dressing of all the main power, lighting and control cables for various systems laid in cable hangers, trays and conduits.
 - C. Proper clamping and binding of cables with the help of binding wire at primary stage and finally with the help of non-releasable cable ties and cable clamping strips.
 - D. Marking/indication of all the emergency as well as safety related electrical components as per requirements.

16. **General**

The electrical / electronic equipment / material shall generally be manufactured, supplied and installed and tested as per Classification Society / Naval Standard Specification and reference specification mentioned where applicable. Inspection of these equipment will be carried out by Yard / Classification Society / Statutory Authority / Warship Overseeing Team as applicable.

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Switch board and other items falling under the preview of Classification Society approval for assigning class notation, shall be manufactured, installed and tested as per Classification society rules.

Reference shall be submitted by the vendor for the identical equipment / system already installed / approved for other Naval Vessels.

COTs items shall be proposed by the contractor and accepted / installed based on maker's test / guarantee certificate as per applicable governing specification of the item / equipment.

17. **Equipment Installation and Materials**

All equipment shall be fixed with securing bolts provided with nuts. Self locking nuts shall be avoided. For items of equipment weighing more than 40 kgs in weight, suitable eye plates shall be fitted on deck heads at approved positions to facilitate lifting of the complete equipment. Items in the vicinity of magnetic compass shall be fitted in accordance with Para 3 to 6 of BR 100 / OEM recommendations. Suitable precautions shall be taken to attach steel fittings / structures with aluminium alloy fittings / structures to avoid electrolytic / bimetallic corrosion. A warning label red in colour with white letters indicating danger 415V AC shall be fitted wherever applicable on the equipment. All cable trays, cable hangers shall be made of perforated aluminium alloy structures, so as to keep the weight of such fixtures to a minimum.

18. **Wiring**

Complete feeder list giving details for each feeder and branch circuit of the load, cable size, type of cables rating or setting of breakers, rating of fuses / MCBs and switches to be included in electrical power supply scheme.

19. **Tools and Test equipment**

Special tools as required for Operation & Maintenance onboard recommended by manufacturer of the equipment to be supplied by contractor as a standard scope. Test equipment shall be additionally supplied by the vendor under their standard scope as per IN CRETE list as under and one set each per vessel. The make and model to be selected and supplied from the below mentioned list.

Common Range Electrical Test Equipment List [CRETE]

No.	Description	Model No.	Manufacturer
1	Ammeter Tong Tester	FLK 336 DCM 30A	M/s World Technic, Mumbai M/s Motwane, Mumbai
2	DMM 1000V (Hand held)	FLK 179/189 DM 352	M/s World Technic, Mumbai M/s Motwane, Mumbai
3	DMM 1000V (Bench held)	CDM 250	M/s Tektronix, Bangalore

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		DM 453	M/s Motwane, Mumbai
4	AC Mili Volt Meter	5002	M/s APLAB, Mumbai
5	RF Multi Meter 1 GHz	3145	M/s VXL, Faridabad
6	Insulation Tester 1000 V	28404 D 2K	M/s OSAW, Ambala M/s Motwane, Mumbai

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No.	Description	Model No.	Manufacturer
7	Insulation Tester 500 V	28403 D 2K	M/s OSAW, Ambala M/s Motwane, Mumbai
8	Oscilloscope 20 MHz	3305 31204	M/s APLAB, Mumbai M/s BPL, Bangalore
9	Oscilloscope Digital 60 MHz	54621A/5462 2D TDS 210/1002	M/s Aglient (I) Ltd, Mumbai M/s Tektronix, Bangalore
10	Oscilloscope Digital 100 MHz	54624A TDS 220/1012	M/s Aglient (I) Ltd, Mumbai M/s Tektronix, Bangalore
11	Oscilloscope 300 MHz	54815A TDS 3032B	M/s Aglient (I) Ltd, Mumbai M/s Tektronix, Bangalore
12	Oscilloscope 500 MHz	54815A TDS 3052B	M/s Aglient (I) Ltd, Mumbai M/s Tektronix, Bangalore
13	AF Oscillator upto 30 KHz	2010D CFG 253 2152A	M/s APLAB, Mumbai M/s Tektronix, Bangalore M/s VXL, Faridabad
14	AM / FM Signal Generator 260 MHz	2356	M/s VXL, Faridabad
15	Synth. Signal Generator 600 MHz	2018 A 2424 A	M/s GEC, Chennai M/s VXL, Faridabad
16	Synth. Signal Generator 1100 MHz	2019 A 2426 8645 A	M/s GEC, Chennai M/s VXL, Faridabad M/s Agilent (I) Ltd., Mumbai
17	Frequency Counter 600 MHz	600 DU	M/s PLA, Mumbai
18	Frequency Counter 1 GHz	SC 1000 PF	M/s PLA, Mumbai
19	AF Output Power Meter 150 W	2018	M/s APLAB, Mumbai
20	Thru-line Wattmeter 100W with Following element : 25 W (100-250 MHz) 50 W (200-125 MHz) 100 W (50-125 MHz)	3551	M/s VXL, Faridabad
21	Power Meter upto 18 GHz with Sensors (for Agilent 4412A and for GEC 6920A)	NRVD 4418 B 6960 A	M/s Fohde & Schwarz (I) Ltd., New Delhi M/s Agilent (I) Ltd., Mumbai M/s GEC, Chennai
22	Telegraph Tester	4584	M/s VXL, Faridabad
23	Electric Motor Checker	EMC 22	M/s EMC, Hyderabad
24	AM / FM Modulation Meter	2305 4561 D 8901 A	M/s Blue Star, Mumbai M/s VXL, Faridabad M/s Agilent (I) Ltd., Mumbai
25	Shock Pulse Monitor	T 2000 M 900	M/s SPM, Hyderabad M/s Maynard Instruments, Hyderabad
26	IC Tester (TTL and CMOS)	4027	M/s APLB, Mumbai
27	Frequency Counter up to 18 GHz	53150 A CPM 220	M/s Agilent (I) Ltd., Mumbai M/s Blue Star, Mumbai
28	Voltage Breakdown Tester 40	---	M/s AE Ltd., Mumbai

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No.	Description	Model No.	Manufacturer
29	Attenuator RF (100DB)	5321 E Mk II	M/s VXL, Faridabad
30	Current Injection Test set, 150A, 115 V / 230 V	---	M/s AE Ltd., Mumbai
31	32 Channel Logic Analyser	TLA 601	M/s Tektronix, Bangalore
32	102 Channel Logic Analyser	TLA 603 16702/1682A	M/s Tektronix, Bangalore M/s Agilent (I) Ltd., Mumbai
33	LCR Q Meter	4910	M/d APLAB, Mumbai
34	Soldering / De-soldering Station	ASD / DSD SC 7000Z	M/s Signatic, Mumbai M/s QMAX, Chennai
35	HV Probe up to 40 KV	P 6015 A	M/s Tektronix, Bangalore M/s Agilent (I) Ltd., Mumbai
36	Audio Analyser (up to 100 KHz)	8903 B UPL	M/s Agilent (I) Ltd., Mumbai M/s Rohde & Schwarz (I) Ltd., New Delhi

20. **EMI / EMC**

To achieve EMI/EMC harmony, installation is to be carried out as per NECP-500, Part 'A' and Part 'B'. Survey of the EMI/EMC is to be carried out under the supervision of Naval EMI / EMC Cell (NEC), Mumbai.

21. **Economy of Weight and Spaces**

The contractor is to keep in mind continually the fact that economy of weight and spaces is of utmost importance in this vessel. Accordingly, equipment and fittings of as minimum dimensions and weight as possible commensurate with satisfactory operation and maintenance shall be supplied and installed.

22. **Installation of electrical equipment**

Vendor should give due consideration in design regarding routing and position of all electrical system / equipments, so that after any gear subsequently installed in the space around them, the space in their vicinity will be adequate to allow for operation, inspection and maintenance without dismantling other equipment. The position chosen for installation of electrical equipment shall be as dry and cool as possible. Positions / locations where there is a possibility of spray or dripping of water such as pipe joints etc shall be avoided and when this is not possible, suitable protection shall be provided.

All electrical equipment shall be fitted as far as possible from the fire mains fuel / oil lines and tanks. Adequate space shall be provided for removal of armatures or rotors of all rotating machinery including main alternators and the hatches will be of sufficient sizes to enable their removal ashore. The shipping and unshipping route is to be kept as simple as possible and should not require cutting of hard patches.



23. **General Earthing**

All 415V, 230V and 115V electrical apparatus (unless adequately earthed by method of fixing) are to be earthed by means of wire or strip of a current capacity of not less than that of the supply conductor to the apparatus. The lead alloy sheathing or metal braiding of cables shall not be relied upon and used for this purpose. The earthing shall follow the same route as the supply cable runs.

24. **Insulation Tests**

Insulation test for electrical feeders to be carried out as per class requirement and approved GRAQ.

25. **Labelling and Tally Plate**

Anodized aluminium tally plates to be fitted on items of electrical equipment and fitting in accordance with specification for equipment.

26. **Tally Plates**

For all DBS, NLP etc shall indicate the nomenclature of the boxes and the details of incoming and outgoing ckts with the capacity of each fuse / MCB there in.

27. **Diagram Plates**

Metallic diagram plates shall be provided for all control panels, starters, transformers, DBS, rectifiers and Generator etc., clearly showing connections with terminal markings as on the equipment and they shall be secured on the underside of the cover of the equipment.

28. **Fuses**

Where Fuses are used for circuit over current protection they shall conform to international standards and shall be approved by Classification Society and Indian Navy.

29. **Colour scheme of electrical equipment**

Bare metal surfaces of electrical equipment shall be painted with rust proof paint and subsequent finishing paint, except that those specially treated and rendered corrosion free may be left unpainted.

30. **Marking of Busbar and Connections**

Bus-bar and connections of major power equipment shall be clearly marked with tapes, paints, letter of equipment means.

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31. **Acoustic and Visual Signals**

Acoustic and visual signals shall be audible and visual at the designated area and shall be easily distinguishable above the surrounding noise and lighting levels and from other acoustic and visual signals.

32. **Care & Maintenance of electrical equipment**

The contractor shall take all necessary precautions to prevent damage to or deterioration of electrical equipment / fittings, spare gear while stored under their custody in the yard. Efficient preservation / maintenance of equipment shall be carried out in accordance with the maker's instructions until the boat has been finally accepted.

33. **Indian Navy requirements for Test and Trials**

Test and Trials on Electrical installations will be conducted as per EED-S-025 and approved GRAQs and in the presence of and to the satisfaction of warship overseers. For Navigation / Communication equipment, Installation Inspection (II), HATS & SATS will be carried out as per schedules promulgated by Indian Navy. The draft GRAQ/Installation Inspection (II), HATS & SATS schedule will be prepared by the yard and contractor to follow the same as applicable. While draft GRAQs will be submitted to ETMA for scrutiny, the Draft II, HATS & SATS schedule shall be submitted to IHQ-MOD(N) for approval, same to be followed by the contractor. Results of trials shall be accorded in appropriate forms by the contractor and to be supplied in quadruplicate to the yard for onward submission to IHQ-MOD(N). All defects pertaining to supply and work carried out by contractor and discovered or developed during any trials and the installation work carried out during construction of the vessel is to be rectified before acceptance of the vessel by Indian Navy.

34. **Equipment Schedule**

Equipment schedule for all electrical equipment will be prepared by the contractor in consultation with yard and WOT and 5 copies of the same will be forwarded to IHQ-MOD(N).

35. **Main Alternators**

Suitably rated DAs with 100% reserve capacity to meet the electrical loads satisfactorily under various operating conditions will be procured and provided by the yard. Analysis of electric power during operating conditions for the main alternator to be also prepared and submitted by the contractor. The alternators will be self regulated & self exited conforming to specification EEQ-Q-242(R) and will be selected from the standard range approved by the IHQ-MOD(N). The actual capacity of the alternator shall be approved by IHQ-MOD(N) based on load chart. It would be ensured that no generator runs continuously with not less



than 33 % of its rated output under any operating condition. The terminal voltage of alternator shall be controlled between +/- 5% through voltage regulator.

Alternators are not normally required to run in parallel continuously. It shall, however, be possible to parallel the alternators for a minimum period of 5 minutes for changing over of load from one alternator to the other smoothly.

36. **Emergency Alternator**

A suitably rated Emergency alternator for emergency operation [loads] and for operating communication equipments and lighting for WT office will be procured and provided by the yard. Following communication equipments are also to be connected with this emergency generator:

(a)	1 KW HF Tx/	-	01 No.
(b)	100 W HF Tx/Rx	-	01 No.
(c)	V/UHF Tx/Rx	-	01 No.
(d)	Crypto PC	-	01 No.
(e)	NEWN PC	-	01 No.
(f)	Signal Projector	-	01 No.
(g)	Fixed MMB set	-	01 No.
(h)	Remote operating position	-	02 Nos.
(j)	SATCOM	-	01 No.

37. **Voltage drop in 415 V, 3 Phase, 3 wire, 50 Hz system**

Under steady full load conditions, the total voltage drop between alternator terminals and any 415 Volts service shall not exceed 10 Volts. Under motor starting conditions, the voltage at any motor terminals shall not be less than 375 Volts, assuming that a voltage of 415 volts is maintained at the busbar.

38. **Voltage drop in 230 V, 1 Phase, 50 Hz System**

The voltage drop between the transformers secondary terminals and any lamp fitting or appliance in the 230 V AC system shall not exceed 6 Volts, under full load conditions.

39. **Auto Power Management System, Integrated Bridge Management System and Integrated Propulsion Machinery Control and Alarm / Monitoring System**

Auto Power Management system (APMS) as per specification EED-Q-264 will be separately procured and provided by the yard for power generation and distribution. The contractor has to integrate and install all above systems on the vessel/s, as per OEMs requirements under their installation assistance and as per all the requirements of Indian Navy.

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40. **Main switch Board**

Main switch board to be designed as per EED-Q-264/NES-530 and IHQ-MOD(N) approved SOTR for control and distribution of 415V, 3 Phase, 50Hz and 230V, 1 Phase 50 Hz. AC supplies with earth fault protection indication and alarm, made of sheet steel, dead front, deck mounted, effectively drip proof for any angle. Following other requirements of the switch board to be met;

- (a) The switch board to be with moulded case circuit breakers, voltmeter, frequency meter, Ammeter, KW meter with necessary fuses, selector switches, control circuits, indicating lamps etc.
- (b) One change over switch for changing one generator to another generator and shore supply connection.
- (c) One 230V feeder panel with voltmeter, Ammeter and indicating lamps.
- (d) Following protections controls, instruments & indications for DG set shall be provided in main switch board.

Protections

- Over voltage protection
- Over load protection
- Under voltage protection
- Short circuit Protection
- Reverse power Protection

Controls

- | | | |
|-----------------|---|---|
| Main Generators | - | Governor control switch
Synchronising switch
MCCBs of suitable rating for manual switching
Electrical / manual tripping. |
| Shore Supply | - | Manually operated MCCB with Electrical /
Manual tripping |
| Feeders | - | Each feeder will be controlled by a MCB of
suitable rating. |

Instrumentation

- | | | |
|-----------------|---|---|
| Main Generators | - | Ammeter with phase selector switches
Shore supply current transformers
Voltmeter with phase selector switches
Frequency meters |
|-----------------|---|---|

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KW meters (only for main generators)
Synchroscope (only for main generators)

Indicators

- "Generator running" lamps
- "Bus alive" lamps
- "Shore supply on" lamps
- Synchronising lamps
- "Earth fault" lamps

- (e) Each section of the switch board to be provided with anodised wiring diagram at a suitable location to facilitate fault diagnosis/rectification and flame retardant tallies for control switches, instruments, control indications, fuses etc.
- (f) Non-conducting hand rails in front and oil resistant rubber insulating mats with non-skid surfaces in front and back of the switch board to be provided.
- (g) All bus bars to have sufficient current carrying capacity for continuous operation and provisions shall be made for withstanding mechanical strains.
- (h) Terminal marking and colour code to be in accordance with IS 375.
- (j) Fire retardant insulation materials to be used for insulating purposes.
- (k) All cables entering the switch board to be fitted with approved glands meeting specification DGS/EED/VI/1535/R6/BS 4121.
- (l) Classification Society Test Certificate to be obtained and submitted for Main Switch Board.
- (m) No live parts to be less than 12" from deck.
- (n) Construction to be such that all installation, main cabling & maintenance work including removal & replacement of components can be performed from front.

41. **Supply System**

All motor driven machinery, galley and laundry equipment etc of 0.5 KW and above ratings shall be preferably arranged to operate from 415V, 3 Phase distribution system. Machines below 0.5 KW rating and the lighting installation, survey radar, WT, navigational equipment may be arranged for operation from 230 V, 1 Phase, 2 wire system. This supply to be obtained through a 3 Phase



step-down transformer unit.

Emergency light fittings supplied from 24 Volts DC distribution board to be fitted to provide illumination to access ways and passageways and as approved by WOT.

42. **Distribution Boards**

Main supply shall be derived from the main switchboard through feeder MCBs. Further distribution of the supply shall be arranged through distribution boards located at load centres. Distribution Boards/Navigation light panel should be of watertight construction and of minimum dimensions.

All DBs of watertight construction with MCB protection to have minimum spare feeder ways as per requirements specified.

43. **Shore supply arrangements**

A watertight shore supply connection box 415 V, 3 phase, 50 Hz shall be fitted on weather deck at an appropriate position, adequate capacity to meet the requirements of the harbour loads. The Shore Connection Box made of M.S. treated with durable long lasting anti corrosion paint shall be connected by permanent cables to the Switchboard and suitable terminals to be provided for connecting copper flexible cables up to 50 meters length. A phase sequence indicator also to be provided. Shore connection cable of suitable rating to be supplied by the contractor.

Electrical interlocking main generator breakers and shore connection breaker to be provided in such a way that the shore connection breaker cannot be switched "ON" if any one of the main generator breakers is "ON" and vice versa. A reel for stowing the flexible cable to be provided and suitably located on the deck.

44. **Normal & Alternate Supplies**

Normal and alternate source of supply for important services shall be arranged through change over switches. In general, normal supply shall be arranged from the power services nearest to the load and alternative supply from the source farthest from the load. The detailed drawing indicating normal and alternate supplies giving the circuit details, position of equipment, supply source reference etc. to be prepared and submitted by the contractor for onward submission to the IHQ-MOD(N) for their approval.

45. **Arrangement for Batteries and Battery charging**

Required facilities to be provided for maintenance charging of the various batteries used on board ship. A separate battery charging room with stowage space of batteries will be provided with charging rack, working table with lead

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line on top, lead line sink with water supply, cupboard, stool and oil and acid resistant rubber mat. Suitable stowage racks for distilled water in 20 ltrs jerry can will also be provided.

Battery charger for motor boat batteries, miscellaneous batteries and auto emergency lanterns to be supplied and made available by the contractor in the battery charging room. A split battery charger in conversion room for charging the low power batteries at site to be made available.

46. **Transformers**

Required number of 415 V/230 V, 3 Ph, 50 Hz, transformer to be supplied / provided by the contractor to supply the 230 V AC loads. Transformers to be housed in drip proof enclosure with packed cable glands and to be procured and supplied by the contractor from IHQ-MOD(N) approved sources. The transformers to be of Class F insulation and shall be air cooled with separate primary and secondary windings.

47. **Transformer Rectifier**

Required number of transformer rectifiers with tapping to be supplied and fitted to boost/trickle charge the batteries and provide DC supplies for LP services, navigational lights, external communication, echo sounder, survey equipment at bridge and quarter deck etc. Transformer rectifier shall have input of 415 V, 3 Phase, 50 Hz and output characteristics shall be maintained to meet equipment requirements with a change over switch facility of charging batteries of different equipment. Drip proof construction and air-cooled configuration to be provided as per marine practice. The rectifiers to be procured and supplied by the contractor from the IHQ-MOD(N) approved sources.

48. **Motors**

Motors of standard ranges, generally of squirrel cage induction type conforming to EED-Q-071 (R2) having class 'F' insulation, continuously rated, on 415V, 3 Ph, for 0.5 HP and above, and enclosures of IP-56/55/54 will be provided as applicable. Each motor will have thermistor sensor fitted in winding.

Domestic equipment with 230V, 1 Ph, 50 Hz supply, shall be provided with commercial available motor with standard enclosure and with manufacture test certificate.

49. **Cable route**

Cables to be routed and installed by contractor in such a manner so that:

- (a) Maximum protection is offered from the effects of shell fire, rockets, splinters etc.



- (b) Sufficient clearance exists from the ship's side to prevent risk of damage when going alongside, and allow reasonable access to the ships side for emergency repairs when damaged.
- (c) Wherever cables interference with pipelines or trunkings, the cables shall be located closed to the deck head.
- (d) The following compartments shall be avoided for passing the cables wherever possible
 - (i) Bathrooms.
 - (ii) Galley and other compartments subject to a high risk of fire.
 - (iii) Proximity to spindles or shafts
 - (iv) Magazines and dangerous areas, including battery charging rooms.
 - (v) Radio and Radar offices.
 - (vi) Position on structures that require opening for inspection, or renewal of equipment/s.
 - (vii) Hatchways, ladders, stowage and openings.
 - (viii) Proximity of hot pipes or hot joints.
 - (ix) Oil fuel and water tanks.
 - (x) Penetration of bulkheads below the datum deck.

Alternative supply cables to important services shall have the maximum possible vertical and horizontal separation throughout their run as far as possible.

The cables to have sufficient free length to allow relative movement between the equipment and the bulkhead, without undue flexure of the cable or straining of the cable glands. Cable runs in the open or weather decks shall be kept to an absolute minimum. Cable shall not be routed through areas such as deck head high up in main machinery spaces or adjacent to engine exhaust trunks. LFH sheathed silicone rubber cables shall be used.

Where ever cables are passing through watertight bulkheads or decks, watertight multi cable transient (MCT), deck tubes shall be used to maintain the water tightness meeting requirement as stipulated for Naval vessels. Contractor is also to ensure provision of suitable glands in all the equipments where the cable entry connections are required.

Deck tubes shall be fitted where necessary to take flexible cable runs to services on deck above water line. To facilitate identification, the deck tubes shall be painted white, the caps having a green cross painted on a white background.

50. **Flexible cables for emergency supply system**

All main flexible cables of emergency supply system shall be long enough for the ends to join possible connection points furthest apart in their respective compartments whilst allowing most of the cable length to remain on the deck.



Single core cables shall be coloured red, yellow or blue for (0.15 m) at each end to indicate respective phases.

51. **Cable Identification**

Brass identification tallies, one at each end of cable, indicating circuit reference number as per drawings to be provided and fixed by the contractor.

52. **Starters / Control Panel**

Starters conforming to specification EED-Q-071 (R2) are to be procured and provided by the contractor. Direct on-line motor starters shall be provided for all services below 5 HP including portable pumps and Star-delta Starters for motors of 5 HP and above incorporating under-voltage, over-current, short circuit, single phase protection and connection for thermistors in the motor winding.

The starters for Engine room ventilations fans shall be provided with a remote stop push. These push buttons to be fitted outside the engine room near the entrance to the space. The push button shall be recessed type to avoid inadvertent tripping of the starter.

Starter shall be mounted near the equipment and will be locally controlled. Starters located outside the engine room are to be additionally provided with a main switch / isolator with door interlock. System interlocking where necessary to be provided by the contractor.

Each starter to be provided with

- Start / Stop push buttons
- On / off indication lamps
- Control potential transformer 415 V / 230 V of suitable rating
- HRC control fuses
- Thermal overload relay with built in single phase protection

Contactors and overload relays as per approved list of IRS to be used.

Starters for motors to be generally grouped as follows:

- | | | |
|-----------|---|-------------------------|
| Group I | - | Ventilation fans |
| Group II | - | Engine room auxiliaries |
| Group III | - | Other services |

Remote "Stopping" of the required groups during "Emergency" to be provided.

53. **Lighting System**

Single core cables to be supplied and installed by the contractor for lighting



circuits. All single phase loads to be grouped and connected to ensure "Phase balancing" In all spaces, lighting to be grouped so that in the event of any supply failing, a portion of lighting will still be available. All lamps and fluorescent tubes shall be supplied and replaced by the contractor under their standard scope with new ones, one week before the final acceptance of the vessel by Indian Navy. All switch sockets to be of approved make and selected and supplied by the contractor from DQA(N) compendium.

Illumination levels at various spaces to be as specified below;

- | | | | |
|-----|--|---|------------------------------|
| (a) | Workshop, galley | - | 200 Lumen / m ³ |
| (b) | EMR, MCR, Switchboard Room, Gyro Room, Officers accommodation, Amenity spaces, bath room and sickbay | - | 200 Lumen / m ³ |
| (c) | Engine room, Auxiliary machinery room, cabins, Echo sounder and log compartment, SRE comp etc. | - | 150 Lumen / m ³ |
| (d) | Steering gear comp, pump room, wheelhouse, stores, issue room, magazines, hatchways | - | 100-150 Lumen/m ³ |
| (e) | Lobbies, gangways | - | 50 Lumen / m ³ |

54. **Inspection and Certification**

The complete electrical turnkey contract for the 6 nos. Survey Vessels with its all the electrical equipment and machinery to be carried out in accordance with the latest rules and regulations of Indian Register of Shipping (IRS) relevant for class notation +100A1 SSC SURVEY VESSEL G3 LMC UMS CEPAC or equivalent. The vessel will be built in accordance with the IHQ-MOD[N] guidelines of Indian Navy. Electrical work including design, supply, installation, integration and commissioning / trials also required to comply with IHQ-MOD[N] requirements and to be certified for the same. The equipments / material supplied and complete electrical installation work carried out should also comply with the applicable rules, regulation and requirements of the regulatory bodies without conditions/recommendations. The vessel will be built in accordance with the IMO/SOLAS/MARPOL guidelines / regulations as applicable for Survey Vessel, hence electrification work carried out should comply the same as applicable including compliances on personnel safety and other criteria. Complete electrical installation work is to be carried out as per Part "A" and Part "B" of NECP-500, so as to achieve EMI/EMC harmony. Accordingly, survey of the EMI/EMC will be carried out under Naval EMI/EMC cell [NEC], Mumbai supervision.



Test and trial schedule prepared by the yard and approved by IHQ-MOD[N] shall be followed by contractor. All tests and trials shall be carried out in accordance with Naval specification DME303C, EED-S-025, NCD 05804A and GRAQs. Trials are to be conducted in the presence of and to the satisfaction of Naval overseers. These should also include habitability trials for HAB+ standards or equivalent as applicable. Results of the trials to be recorded by the contractor in appropriate forms. Original approval certificates and test reports to be supplied by the contractor for all the components / equipments / material supplied by the contractor.

55. **Procedure for Test and Trials**

The complete electrical work of all the machinery and equipments shall be thoroughly tested to demonstrate their efficient working and to confirm that the complete work is done in accordance with specific approved plan/s as well as system complying classification society rules and Statutory requirements for the intended class of vessel as well as compliance of all the requirements of Indian Navy.

Tests and trials to be performed by the contractor as per the schedule given by the yard.

The testing procedure will be followed generally as specified below.

Builder's test: The vessel's each and every component, machinery and system shall be tested after successful installation onboard at our yard in accordance with the requirements of ship's specifications / classification society / manufacturer's guidelines / Indian Navy and Statutory requirements.

Basin test: The completed work of electrification with respect to all machinery, outfit & equipment shall be thoroughly tested to demonstrate their efficient working & to confirm that all requirement of the specifications & plans are fully complied with:

All DG sets shall be tested in following respect

25% load	-	30 minutes
50% load	-	30 minutes
75% load	-	30 minutes
100% load	-	120 minutes
110% load	-	30 minutes

The governor test for following sudden changes in load will be tested

100% to 0%
0% to 50%
50% to 100%



Tests and trails to be performed by the contractor as per the technical specification and Indian Navy, class and statutory requirements.

Sea trials: At the stage of nearly completion of the vessel, all the tests and sea trials shall be conducted according to the class requirements and method approved by Indian Navy.

Over and above, maneuvring test and other test related to electrical sea load measurements, black out test and the radio and navigation equipments also shall be tested.

During endurance trial, the following shall be tested as relevant for its performance.

DG sets Engine related instrumentation / alarms

Power system and lighting system

All other electrical systems as found necessary by yard / class / Indian Navy / statutory authority

Main engine and gear box related instrumentation / alarms.

56. **Certificates**

Test & acceptance certificates by Indian Navy, classification society & statutory authority for complete system & its machinery/equipment as applicable shall be obtained. Therefore the installation, integration and commissioning to be carried out by the contractor accordingly & tests to be performed & offered to the competent authorities for obtaining relevant certificates as applicable. Maker's test certificates as applicable shall be supplied for all equipments / fittings / items / material in triplicate. One set of all the certificates are to be supplied for submission to Naval Overseeing Team one month before the date of preliminary trials.

57. **Guarantee**

The guarantee to be given by the contractor for the material / equipments supplied by them and the workmanship of installation and integration work carried out by them of the complete electrical system and it's performance for 12 months from the date of delivery of the respective vessel to the Indian Navy.

58. **Care and Custody**

The contractor will be responsible for safe custody of all the material supplied by him and any material handed over to him. All the goods will be treated as fully covered by him for any risk or loss due to theft, short due to negligence on his part. However he will not be responsible for any damage due to natural calamities i.e. accidents, fire, flood or riots.

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59. **Control and Monitoring System**

Installation, integration and commissioning of control system as per RFP requirements of Indian Navy & class / statutory requirements including installation, integration and commissioning of Main Engine Control (Local & Remote controls from M.E. Room), Protecting & Safety devices (Emergency trip, turning interlock, Automatic slow-down), Controls of R.O. Plant, Controls of Electric Generating plant (Automatic Opn, Synchronizing & load sharing controls), Controls of Eme. D.G., Cooling Water system, lube Oil system, fuel oil system, compressed air system, scavenge air system etc. The scope of work also includes installation, integration and commissioning of engine telegraph. Vendor is also required to set up and install electrical system for engine control room, control & supervising electrification in navigation space with measuring instrument panel, control switch panel & chart table controls as per Indian Navy / class / statutory requirements.

60. **Approval of Drawings and specifications**

Within two weeks of placement of order, before commencement of work, the contractor is to forward to the yard, a drawing and technical information / calculation schedule indicating list of documents / drawings and proposed dates by which these will be submitted to the yard, class, statutory authority and IHQ-MOD(N) respectively for their approval. This list should contain the drawings / documents / information / calculations etc. required as per all above agencies / authorities in addition to the drawings / details which contractor will prepare for his own job execution purpose. All the drawings and technical informations are to be submitted by the contractor on magnetic media with required number of hard copies for onward submission to IHQ-MOD[N] for their approval and record. All the drawing / technical information that requires the yard / class / statutory authority approval are to be first submitted by the contractor to all above for their approval and after obtaining their approvals same shall be submitted to IHQ-MOD(N) for their final scrutiny, comments and approval.

Before manufacturing, supplying or installing any equipment, fitting or material, the contractor is to forward final detailed drawing / specification for the prior approval of all concern. Approval of the yard, class and statutory authority as applicable shall be obtained by the contractor prior to submission to IHQ-MOD[N]. The approval of any proposal, specification, drawing will not exonerate the contractor from their responsibility in connection with the correct supply, installation, integration and functioning of the systems and complete installation.

The contractor to furnish a list of "As fitted" drawings of the various compartments / systems and "As made" drawings of various equipment proposed to be supplied. Same shall be subject to approval of the yard and IHQ-MOD(N). All drawings and documents are required to be supplied on magnetic media also in addition to the hard copies. The electronic documents to be in compliance



with IETM/CALS format. The documents such as Ship Fit Definition [SFD], D-787, list of B&D and onboard spares, OEM / Manufacturer / Vendor details etc. to be provided in Integrated Logistic Management System [ILMS] format. The contractor is to ensure that the tracings and prints are of the best quality and to the satisfaction of the yard and Naval Overseer. The requirements of sets of “As fitted / As made” drawings, velographs, manuals and other documents are to be supplied by the contractor / vendor for distribution to various Naval authorities as per following list for “Distribution of Documents”.

DISTRIBUTION OF DOCUMENTS

SL. NO	DESCRIPTION OF DOCUMENTS	SOURCE	TYPE OF DOCUMENT	IHQ-MOD(N)				ADMIN AUTH *				REPAIR AUTH *				MS *				WPS/WOT	SHIP SMA	MTUJ/ETMUJ/WATT	DQA(WP)/DQA(N)	SHIVAJI/VALSURA	TOTAL		
				PROD. DTE.	PROF. DTE.	DFM	DLS	HQ WNC	HQ ENC	HQ SNC	HQ ANC	ASD (M)	ASD (V)	NSRY(C)	NSRY(PB)	FMU(B)	BMU(V)	MS(B)	MS(V)							NSD(PB)	NSD(C)
1	AS FITTED DRAWINGS	S/B	VELO		1																					2	
			PRINT	1	1	1				1											1	1					
2	SCHEMATIC SYS. DRGS	S/B	VELO		1																						2
			PRINT	1	1	1				1						1	1	1			1	1	1	1	1	1	1
3	AS MADE EQPT DRGS	S/B	VELO		1																						2
			PRINT	1	1	1				1						1	1	1			1	1					
4	PHOTOGRAPH	S/B	NEG		1																						2
			PRINT	1	1					1											1						
5	CPL/PIL	S/B	PRINT	1	1		1							1	1	1											9
6	EQPT HAND BOOK	S/B	PRINT	1	1	1				1				1	1	1											14
7	INSTALLATION SPECS	S/B	PRINT	1	1	1				1																	7
8	EQPT CODE	S/B	PRINT	1	1	1	1			1																	9
9	MACHINERY / EQPT. INFO BOOK	S/B	PRINT	1	1					1				1	1												10
10	SHIP TRIAL REPORT	S/B	PRINT	1	1																						6
11	TEST CERTIFICATES LLYODS / IRS ETC	S/B	PRINT	1	1																						6
12	SHIP TRIAL REPORT CST/PMT	S/B	PRINT	1	1					1				1	1												9
13	EQPT ORDER COPY	S/B	PRINT	1	1																						4
14	OPERATION, MAINTENANCE MANUAL.	S/B	PRINT	1	1									1	1												9
15	MATERIAL SCHEDULE	S/B	PRINT	1	1																						5
16	MAINTENANCE SCHEDULE	S/B	PRINT	1	1	1				1				1	1												11
17	D-787	S/B	VELO		1																						1
			PRINT	1	1	1	1				1						1										
18	HATS/SATS	S/B	PRINT	1	1																						2

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