

Tender Ref. No. ED/EE-III/OT-I/G/09-10/31
GOVERNMENT OF PUDUCHERRY
ELECTRICITY DEPARTMENT

Telephone No. 2338689

Office of the Executive Engineer-III, Electricity Department. Puducherry – 605 001.

Tender Notification No. 323/ED/EE-III/OT-I/G/2009-10/32. dt.20.11.2009

Name of the work: Supply, Delivery, Erection, Testing and commissioning of One no. of 500 KVA, 415 volts, Diesel Generator Set in Acoustic Enclosure with AMF Control Panel with all accessories at Legislative Assembly Complex, Puducherry.

- i) Last Date & Time for receipt of Tender : **16-12.2009 upto 11.00 A.M.**
- ii) Date & Time of Opening of Tender : **16.12.2009, 3.30 P.M.**

Price: Rs.500.00
(+ 4 % VAT)

To
Thiru./Messrs.

Serial No :
Cash Receipt :
& Date

EXECUTIVE ENGINEER-III
ELECTRICITY DEPARTMENT
PUDUCHERRY.

- Encl: 1. Notice inviting tender.
2. Section-I – General Terms and conditions
3. Section-II – Technical – General requirements
4. Section-III – Technical Specification for Diesel Generator Set.
5. Section –IV – Schedule of Work/Binding Schedule.
6. Schedule – ‘A’

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GOVERNMENT OF PUDUCHERRY
ELECTRICITY DEPARTMENT

Notice inviting tenders
(Central P.W.D code, Paragraphs 94, 95)

Division: III

Sub Division: Building Town

1. Tender in the prescribed form are hereby invited on behalf of the President of India for “Supply, erection, testing and commissioning of one no of 500KVA , 415Volts Diesel Generator Set in acoustic enclosure with AMF Panel) with all accessories at Indira Gandhi Government General Hospital & Post Graduate Institute complex, Puducherry.

2. The estimated cost of the work is Rs. 43,87,090/-

3. Printed forms of tenders consisting of complete specifications, the schedule of quantities of the various clause of work to be done and the set of conditions of contract to be complied with by the person whose tender may be accepted, can be purchased at the office of the EXECUTIVE ENGINEER – III, Electricity Department, Puducherry – 605 001 on all working days between 9.00 A.M to 4.00 P.M.on payment of Rs. 500/- in cash plus VAT at 4 %

4. Issue of tender forms will be stopped at 4.00 P.M. on 15.12.09.

5. The site for the work is available at the complex of Indira Gandhi Government General Hospital & Post Graduate Institute, Puducherry.

6. Tenders which should always be placed in sealed cover with the name of the work written on the envelope will be received by the Executive Engineer-III, Electricity Department, Puducherry 605 001 upto 11.00 A.M on 16.12.09 and will be opened by him in his office on the same day at 3.30 P.M. If the opening date happens to be a holiday the tenders will be received/opened on the next working day.

7. The time allowed for carrying out the work will be sixty days from the seventh day after the date of written orders to commence work.

8. The tenderer should quote in figures as well as in words the rate and amount tendered by them. The amount for each item should be worked out and the requisite totals given.

9. When a tenderer signs a tender in an Indian Language, the total amount tendered in the case of C.P.W.D. Form 8 should also be written in the same language. In the case of illiterate tenderer, the rates or the amounts tendered should be attested by the witness.

10. Earnest Money amounting to Rs. 87,742/- (unless exempted) in receipted Treasury Challan of Government of Puducherry /deposit receipt of a schedule guaranteed by the Reserve bank of India, must be accompanied each tender and each tender is to be sent in a sealed cover super scribed with the tender number , name of the work and the

date due for opening, addressed to the EXECUTIVE ENGINEER-III, Electricity Department, Puducherry 605 001.

11. SECURITY DEPOSIT: The contractor, whose tender is accepted (unless exempted) will be required to furnish by way of security deposit for the due fulfillment of his contract.

The security deposit will be collected by deductions from the running bill of the contractor of the contractor at the rate mentioned below:

A sum of 10% of the gross amount of the bill shall be deducted from each run bill of the contractor, till the sum along with the sum already deposited as earnest money deposit will amount to security deposit of the 5% of the tendered value of the work. In addition the contractor shall be required to deposit to an amount equal to 5% of the contract as performance security within ten days from the date of receipt of the provisional order.

12. The acceptance of a tender will rest with the Superintending Engineer-II Electricity Department, Puducherry-605 001 who does not bind himself to accept the lowest tender and reserves to himself the authority to reject any or all of the tenders received without assigning any reason. All tenders in which any of the prescribed conditions are not fulfilled or are incomplete in any respect are liable to be rejected.

13. Canvassing in connection with tender is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable for rejection.

14. All rates shall be quoted on the proper forms of the tender alone.

15. Any tenderer quoting in percentage above/below will not be accepted and will be summarily rejected. However where a tender voluntarily offers a rebate for payment within a stipulated period, this may be considered.

16. On acceptance of the tender, the name of the accredited representative(s) of the tenderer who would be responsible for taking instructions from the Engineer-in-charge shall be communicated to the Engineer-in-charge.

17. Special care should be taken to write the rates in figures as well as in words of the amounts in figures only, in such a way that interpolation is not possible. The total amount should be written both in figures and in words. In case of figures, the word "Rs" should be written before the figure of rupee and word "P" after the decimal figures e.g. Rs. 2.15 p. and in case of words the word Rupees should precede and the word (Paise) should also be written at the end. Unless the rate is in whole rupees and followed by the word only it should invariably be up to two decimal places. While quoting the rate in schedule of quantities, the word "only" should be written closely following the amount and it should not be written in the next line.

18. The Superintending Engineer -II does not bind himself to accept the lowest or any tender.

19. VAT or any other tax on material in respect of this contract shall be payable by the tenderer and Government will not entertain any claim whatsoever in this respect.

20. The contractor must produce Income Tax Clearance Certificate if required.

21. The tenderer shall not be permitted to tender for works in Electricity Department, Puducherry (responsible for award and execution of contract) in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of Executive Engineer and Assistant Engineer (both inclusive). He shall also intimate the names of person who are working with him in any capacity or are subsequently employed in the Electricity Department or in the Secretariat of Government of Puducherry. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this department.

22. The tenderer shall give a list of non-gazetted Electricity Employees related to him.

23. No Engineer of Gazetted Rank or other Gazetted Officer employed in Engineering of Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of two years from date of retirement from Government Service without the previous permission of Government of India. This contract is liable to be cancelled, if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of Government of India as aforesaid before submission of the tender of engagement in the contractor's service.

24. The tender for works shall remain open for acceptance for a period of ninety days from the date of opening of tenders. If any tenderer withdraws his tender before the said period or makes any modification, in the terms and conditions of the tender which are not acceptable to the Department, then the Government shall without prejudice to any other right of remedy, be at liberty to forfeit 10% of the said earnest money absolutely.

25. The tender for the work shall not be witnessed by other tenderer/ contractor who himself / themselves has / have tendered who may and has / have tender / tendered for the same work. Failure to observe this condition would render rejection/cancellation of tender of them.

26. The contractor shall submit list of works which are in hand (progress) in the following form:

Name of Work	Name and particulars of division where work is Being executed	Amount of work	Position of work in progress	Remarks
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27. Rates quoted by the tenderer in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words. However if a discrepancy is found the rates which correspond with the amount worked out by the tenderer shall be taken as correct.

28. If the amount of an item is not worked out by the contractor or it does not correspond with the rate written either in figures or in words then the rate quoted by the contractor in words should be taken as correct.

29. Where the rate quoted by the tenderer in figures and in words tally but the amount is not worked out correctly, the rate quoted by the contractor will be taken as correct as not the amount.

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SECTION – I
GENERAL TERMS AND CONDITIONS

Scope:- This section covers the general terms and conditions of this contract, for Supply, erection, testing and commissioning of 500KVA, 415Volt diesel Generator Set and all accessories at Indira Gandhi Government General Hospital & Post Graduate Institute, Puducherry.

2. Visit of site by contractor:- The tender is advised to visit the site to acquaint himself with the site conditions, approaches, availability of weather conditions and all other relevant information required for tendering before submitting his tender.

3. Tender Clarification:- The tenderer shall note that if any clarification regarding specification, conditions of contract, schedule quantities or scope of works required he should contact the office of the Executive Engineer-III, Electricity Department, Puducherry 605 001. No claim on account if any ambiguity in any respect will be entertained.

4. Comparisons of the Biddings:-

a) The tenderers shall offer their bidding in the prescribed schedule of work attached with this tender for all the activities mentioned therein.

b) The quantities given under the bidding schedule of this tender are tentative. The department reserves the right to order the final quantities, for which the unit rates quoted in the tender by the tenderer, shall be considered as valid.

5. Completeness of the contract:-

Any fittings or accessories which may not have been specifically mentioned in the specifications but which are usual or necessary in the equipment of similar plant or for efficient working of the plant shall be deemed to be included in the contract and shall be provided by the contractor without extra charges. All plant and apparatus shall be completed in all details whether such details are mentioned in the specifications or not.

6. Bidding:-

a) The tenderer must quote the firm rates for all the items of works described in bidding schedule section- IV without fail. The variation in the bidding rates will not be allowed on any ground such as mistake.

b) The rate for each activity must include the following:-

i) Cost of materials/equipment.

ii) All charges for containers and packings.

iii) All charges necessary to effect free delivery of the materials/equipments and other T & P items at the work site specified in the tender.

iv) All charges such as freights, insurance, customs, excise, clearing charges, other duties such as octroi etc.

v) Sale tax or any other tax on materials/equipment/T&P covered in the contract.

vi) Erection, testing and commissioning charges in respect of all the items required to complete the entire work under each activity and service tax if any.

c) The tenderer shall submit the drawing of the diesel Generators Set complete with dimensions and clearances, technical specification for Genset and acoustic canopy of manufacturer and also for AMF panel in full shape and guaranteed technical particulars in schedule -A along with the tender.

7. Eligibility for Tenderer:-

The contractor shall possess/engage A/B grade Electrical Contractor License issued by the Licensing Board of the Union Territory of Puducherry or of equivalent grade of electrical licensing board/department of other states/UT. Also the tenderer should have experience in subject work of similar capacity in any government organization/department of UT of Puducherry or other states or Government of India.

8. Standard:-

a) Unless otherwise specified, all the materials/equipments and the work shall comply in all respects with the requirements of the specifications under section-II, III & IV and annexure-I attached with this tender documents.

b) Where necessary the successful tenderer will have to submit the design/drawings/test reports in respect of electrical and Civil works to the Engineer in charge of the department for approval before taking up the works for execution.

9. Line clear:-

Erection of line/structure/equipment near the existing electrical installation and modifications to the existing installations shall be carried out after obtaining proper line clear from electricity Department authorities by the contractor of main representative. For such works (which require line clear) requisition for line clear indicating the date and duration shall be given at least three days in advance. The work has to be arranged and completed on the date and duration indicated by electricity department in the line clear which will be arranged depending on the power supply condition. Notwithstanding the above, if line clear is required to be returned by engineer-in-charge at any stage of work, the work shall be stopped immediately and the line/equipment is to be made ready for charging and the line clear returned after clearing of all men and equipment employed for work.

10. Place of manufacture & Inspection:-

The tenderer shall state in his tender the places of manufacture, testing and inspection of the various portions of the works included in the contract. Authorized representative of the department shall be present at the time of all tests and the contractor shall provide all necessary facilities for the same. Representative of the purchaser shall be entitled to access to the sub-contractor's work at any time

during the working hours for the purpose of inspecting and testing the manufacture of materials equipments and building plant.

11. Failure to meet Guarantees and Requirements of the specifications:-

Should the factory tests or the operation of any piece of apparatus under service/conditions show that it does not meet the guarantees and/or the requirements of this specifications it shall be options with the purchaser to accept or reject the apparatus, and direct the contractor to at once proceed to furnish such new parts as may be necessary to make it meet the guarantees and requirements. All expenses of furnishing and of installing new parts or alternations to existing parts and all test made necessary by failure of the apparatus to the guarantees and other requirements of the specifications shall be borne by the contractor.

12.co-ordination:-

In the event of tenderer offering items manufactured by different manufactures, it will be his responsibility to fully co-ordinate the activities of each manufacturer in such a way that the complete equipment contract is supplied in accordance with the contract. No extra charges shall be paid for these services.

13. Financial Resources and experience:-

The tenderer shall submit a statement of facts in details as to his previous experience in performing similar or comparable work and of the business and technical organisation. Financial resources and manufacturing facilities available. The tenderer shall also furnish the list of important consumers for which material were supplied and/or erected in India and also testing facilities available at contractor's work.

14. Deviations:-

Any deviations from the specifications, found necessary by the tenderer, shall be clearly set forth in the schedule-B giving valid basis for such deviations. The advantages claim, if any due to such deviation shall be clearly indicated.

15. Insurance:-

This is a work contract. The contractor shall take an open policy for the erection, insurance to cover the risks by way of damages to property or person in the execution of the contract including third party liability. The insurance shall include Generators Set.

16. Guarantee:-

The contractor shall warrant that the work is carried out in accordance with the specification. The equipment, structure etc., supplied will be free from defects

in materials and workmanship. The contractor shall furnish performance guarantee for a period of twelve months from the date of commissioning or eighteen months from the date of dispatch whichever is earlier. All equipments supplied and installed shall be covered by warrantee for 12 months effective from the date of acceptance of the work by the department on handing over by the successful tenderer, against defective workmanship and materials, if any equipment/ part is found to be defective due to faulty workmanship. The whole installation or any part thereof found defective during the guarantee period shall be replaced/ repaired by contractor at free of charge as decided by the department.

17. Completion period:-

The time allowed for completion for all the works covered under this contract shall be 60 days from the seventh day after the date of work order. The period includes monsoon.

18. Payments:-

The terms of payment shall be in accordance with provisions contained under C.P.W.D form 8 for the item rate tender and contract of works. All payments till final bill is selected shall be regarded as advance payments.

SECTION – II
TECHNICAL – GENERAL REQUIREMENTS

1. SCOPE:-

This section covers the general technical requirements to be complied with in respect of this contract.

2. APPLICABLE RULES AND REGULATIONS:- Installation shall be carried out conformity with I.S.S. wiring regulations for electrical equipments and the installation shall also comply with the requirements to Indian Electricity ACT 1910 and Indian Electricity Rules 1956 as amended upto date and any revision thereof that may be issued during the currency of the contract. Where not specified otherwise, installation shall generally follow the Indian standard codes of practice.

3. COMPLETENESS OF TENDER:-

All fittings, unit assemblies, accessories, hardware foundation bolts, terminal lugs for electrical connections, cable glands and miscellaneous materials or accessories or items of work which are useful and necessary for efficient assembly and working of the equipment shall be deemed to be included in the tender within the overall cost quoted. The equipment shall be complete in all details whether such details have been mentioned or not.

4. TEST CERTIFICATES:-

Copies of all documents like routine and type test certificate of the equipment carried out at manufactures premises shall be furnished, as required.

5. PAINTING:-

The tendered cost shall include cost of painting of entire iron works complete in the completed installation. All iron works barring the contact areas of moving parts shall be painted before dispatch to the site at the shop with two coats of anti-corrosive primer paint. Final finishing and painting shall be invariably done at site. One coat of final finishing of approved colour may be done at the factory before dispatch, if considered necessary by the tenderer, on such components which will not need removal of such paints at site during assembly work. After completing the installation and assembling, a final coat of painting of approved colour shall be done, at site.

6. STANDARDS:-

The tenderer shall clearly state in his offer standards adopted for the design and manufacture of the equipments. All equipment shall conform to latest Indian Electricity Regulations and regards safety, earthing and other provisions specified therein for installation and operation of the electrical plant. The entire work shall also conform to the relevant parts of CPWD specifications for electrical works as applicable and amended up to date in general and to detailed requirements under this specification, in particular. Any deviation made by the tenderer should be

clearly brought out under “SCHEDULE OF DEPARTURE” giving reasons for the deviation as well as explaining how the deviations would add to an improved performance.

7. GENERAL WORKMANSHIP:-

All manufactured/fabricated items shall conform to first class workmanship and shall comply with the best commercial standards for ruggedness of construction.

8. DATA & DRAWING TO BE FURNISHED BY THE TENDER:-

8.1 ALONGWITH TENDERS:-

The tenderer shall furnish along with the tender detailed guaranteed technical particulars as scheduled, manufacturer technical specification along with complete accessories required for performance of the diesel generator literatures, pamphlets, performance data etc.

8.2 AFTER AWARD OF WORK:-

The successful tenderer shall also be required to submit the following data and drawings in triplicate within 10 days for approval before manufacture of the equipments and commencement of work.

- a) General arrangement drawing of the equipment's including layout drawing complete with dimensions.
- b) Details of foundations and building details etc. that will be required for the equipment.
- c) Weight of the assembled equipment.
- d) Electrical control schematic diagram.
- e) operation and maintenance manual and maintenance schedule.
- f) Illustrated spare parts manuals.

TECHNICAL SPECIFICATION FOR DIESEL GENERATOR SET

1. SCOPE:-

This specification covers the design, manufacture test at works, supply, installation testing and commissioning of 500 KVA Diesel Generating set complete with all accessories like, starting batteries, control panel, interconnecting cable, tank, fuel/coolant/ exhaust pipes, silencer, anti vibration mountings, foundation etc.

2. STANDRAD:-

The generating set shall be designed, manufactured and tested in accordance with the latest revision of Indian standards.

IS 10002/1981 - Specification for Diesel Engines as amended upto date
IS 4722/2001- Rotating Electrical Machines - Specification(second revision)

3. GENERAL:-

The generating sets shall be robust in construction factory tested and assembled to ensure perfect alignment of Engine and Alternator on a common base frame. The base frame shall be fabricated out of adequate thickness rolled steel sections. The set shall be mounted on anti-vibration mounting to prevent transfer of vibration to the foundation and structures. The equipment shall be suitable for operating at a hot humid atmosphere at an ambient temperature of 45 degree centigrade.

4. DIESEL ENGINE

The engine shall be multi-cylinders, vertical, 4 stroke, Direct Injection, water cooled type, developing the rated Horsepower at a speed of 1500 rpm. The engine shall be provided with an Hour meter to record the hours of operation. Suitable engine heaters shall be provided to ensure quick starting of the engine after prolonged shut off where necessary.

4.1 Starting:-

The engine starting shall be by means of totally enclosed axial type electric starter suitable for 24 volts DC. The DC supply shall be derived from a heavy duty 24 volts maintenance battery.

4.2 Cooling:-

An engine driven centrifugal pump shall be employed to circulate the coolant through a cooling radiator with an axial blower fan. A temperature gauge shall be provided with contacts for stopping the engine on high temperature.

4.3 Lubrication:-

Pressure lubricating oil system with an engine driven pump shall be provided to cover to complete engine, with built in oil coolant heat exchangers. Full foam filters removable elements shall be provided and these shall be located at easily accessible location for ease of maintenance. The supply shall include first filling of lubricating oil. An oil pressure gauge shall be provided to monitor the lubrication oil pressure. The gauge shall be provided with contacts for stopping the engine on failure of lubricating oil flow.

4.4 Governor:-

The governor shall be of electronic type suitable for monitoring constant engine speed within the specified limits for auto parallel and auto load sharing operation.

4.5 Exhaust:-

The exhaust piping system shall be supplied with a residential silencer. The exhaust piping and the silencer shall be wrapped with rock wool and/or calcium silicate. The outside shall be neatly wrapped with aluminum cladding. The exhaust line shall be extended beyond the height of the utility building roof as required by pollution control norms.

4.6 Daily Service Tank:-

The supplier shall supply and install Daily Service Tank of sufficient capacity 990lts to enable running of the generator set for 12 hours continuous run. The Daily Service Tank shall be fitted with necessary fuel gauge with shut off cocks.

4.7 Pipe works:-

All necessary pipes and accessories for cooling water, lubricating oil, fuel, oil and exhaust shall be designed and supplied to suit the standard arrangement for a system, mounted on anti-vibration mountings.

4.8 Foundation and Anti-Vibration Footing:-

The generating set shall be mounted on standard size cement concrete foundation with required number of anti-vibration footings to prevent transfer of vibration to the foundation and structure.

5. **ALTERNATOR**

The alternator shall be 3 phase 0.8 PF 415V, 4 wire 1500 rpm, housed in screen protected drip proof enclosure. The alternator shall be capable of delivering rated output at rated power factor with,

- a. Terminal voltage differing from the rated value by not more than +/- 5%.

- b. Frequency differing from the rated value by not more than +/- 0.5%.
- c. Short circuit capacity of 300% for 10 seconds.
- d. Over load capacity of 110% for one hour.

5.1 INSULATION:-

The insulation shall be class H and shall be fully impregnated for use in hot, humid, tropical climate conditions, with an ambient temperature of 50 deg. C

The stator and rotor windings of the alternator and the exciter shall be provided with acid resistant varnish finish.

5.2 BEARINGS:-

The alternator shall be provided with single bearing or two sleeves to ensure perfect alignment under all conditions. The bearing shall be self-lubricating type. Close coupling of single bearing alternator is preferable.

5.3 VOLTAGE REGULATOR:-

A rapid response voltage regulator shall be provided to regulate the generated voltage. The overall regulations from no load to full load, including cold to hot variation and load power factor of 0.8 lag to unity shall be within 2% of the normal voltage. The excitation system shall be designed to promote rapid voltage recovery following sudden application and disconnection of load.

6. ACOUSTIC ENCLOSURE:-

The acoustic enclosure should be supplied along with DG set from the manufacturer outlet itself as per CPCB norm.

6.1 Construction:-

Acoustic enclosure shall be of powder coated and fabricated out of 16 SWH CRCA MS sheet. Powder coating shall be done after seven tank surface preparation process of sheet metal. The canopy shall have four hinged doors, one door with glass window to view proper parameters on the control panel. The canopy and doors shall have inside lining of fire retardant foam/glasswool as acoustic materials.

The base frame shall be fabricated in ISMC channel or in sheet metal, with lifting hooks for convenient lifting of complete set ie along with canopy, engine and alternator.

The sound level shall have less than 75 db (A) at a distance of 1 meter. The allowable temperature raise inside the canopy is 5 to 7 deg. Centigrade. The measurement of noise will be as per ISO 3744/ ISO 8528 (Part 10) standard.

6.2. Salient features:-

The canopy shall have the following features.

1. Open air installation
2. Lockable doors
3. External accessible emergency stop button
4. Provision for taking out exhaust gases through suitable pipes to prevent any leak pressure on the engine.
5. Provision for the second residential / hospital silencer to reduce the noise level as specified.

7. AUTO MAIN FAILURE PANEL:-

7.1 CONSTRUCTION:-

7.1.1 GENERAL FEATURES:-

The control panel shall be fabricated out of sheet steel, totally enclosed, dust, damp and vermin proof of free standing floor mounted and front operated type. It shall preferably be made into sections such that as far as feasible, there is no mixing of control, power, DC and AC functions in the same section and they are sufficiently segregated excepting where their coming together on unit like relay, contactor etc. is necessary. Sheet steel used for fabrication shall not less 2 mm thick .Bus- bar shall be two run of 50x10 mm copper flat. Outgoing shall be of two way with HRC fuse protection. All indication lamps, instruments, meters etc. shall be flush mounted in the front.

7.1.2 EARTHING ARRANGMENT:-

A frame earth bus of copper shall be run at the rear of the board/connecting all the sections and all sections shall be suitably bonded to the earth bus. Earth terminals shall be provided at the end for connections to earth system. Earth shall be of anti-vibration proof.

7.1.3. POWER CABLE:-

Power cable between alternator and Auto Main Failure panel shall be 2 run of 3 1/2x 300 sq mm cable.

7.1.4. GLAND PLATES:-

Removable gland plates sectionalized for receiving various cables that are to enter on to the section and un-drilled or with suitable knockout shall be provided at the bottom of the panel sections, where heavy cables are to be brought and terminated. Suitable clamps shall also be incorporated to receive the stress on the glands due to the weight and bends of the cable.

7.1.5. TERMINAL BLOCKS AND WIRING :-

Terminals blocks of robust type and generally not less than 15A capacity 250V grade for DC, 1100 V grade for AC, MCB of required capacity for

controlling the each circuit and rest of the junctions shall be employed in such a manner that they are freely accessible for maintenance. All control and small wiring from unit to unit inside the panel shall be also be done with not less than 1.5sq.mm copper conductor PVC insulated 1100V grade cables. Suitable colour coding shall be adopted. Wiring shall be neatly formed and run preferably function wise and as far as feasible segregated voltage wise. All ends shall be identified with ferrules.

7.1.6. LABELS :-

All internal components shall be provided with suitable engraved identification labels. Labels shall be fixed on buttons indication lamps etc.

7.1.7. PAINTING :-

The entire panel shall be painted with seven tank process powder coat.

7.2. SYSTEM- OPERATION :-

The control cubicle shall incorporate equipments and system to afford operation requirements as under.

7.2.1 AUTO-MODE :-

- a. Line voltage monitor shall monitor supply voltage on each phase. When the main supply falls completely or falls below the set value (variable between 80% and 95% of the normal value) on any phase, the monitor module shall initiate startup of diesel engine to avoid initiation circuit.
- b. A three attempt starting facility shall be provided 6 seconds ON, 5 seconds OFF , 6 seconds ON. If at the end of the third attempt the engine has not already started and built up voltage, the engine shall be locked out for starting. A master timer shall be provided for the functions. Suitable adjustable timers shall be incorporated which will make it feasible to vary independently ON-OFF setting period from 1-10 seconds. If the alternator does not built up voltage after the first and second start as may be prescribed, further starting facility will be reset.
- c. Once the engine has built up voltage, the alternator circuit breaker should be closed connecting load to the alternator. The load is now supplied by the alternator.
- d. When the main supply is restored and healthiness is sensed by the line voltage monitor setting both for under voltage and unbalance, after the quality is monitored by a suitable timer which can be set between 1 to 10 minutes, the load shall be transferred automatically to MAIN supply and the alternator should be under shutdown. Mains take over the supply to load.
- e. The diesel alternator set reverts to stand by for next operation as per (a), (b) and (c) above.

- f. Alternator and mains circuit breaker are invariably electrically interlocked such that unless one is OFF and the other cannot be made ON.
- g. The circuit breaker should have suitable motor as well as manual operated spring close mechanism with limit switch.

7.2.2 MANUAL MODE:-

- a. In manual mode it shall be feasible to start up the generator set only by the operator.
- b. Alternator circuit breaker closing and tripping shall be also through operator only by pressing the appropriate button on the panel.
- c. Engine shut down otherwise due to faults shall be manual by pressing a 'stop' button.

7.2.3 TEST MODE:-

- a. Sequence 7.2.2. (a) & (b) shall be completed.
- b. Engine shall build up voltage but the set shall not be connected to load by closing up alternator connection. The load shall continue to be on MAIN supply. Monitor of generator's performance for voltage /frequency etc. shall be feasible without connecting the load.
- c. During test mode, the main power supply has failed, the load shall automatically get transfer to alternator.
- d. Bringing the mode selector to auto position shall shut down the sets as per sequence 7.2.1 (a) to (d) provided main supply is on. If the main supply is not available at that time, the alternator shall take load as in (c) above.

7.3. ENGINE SHUT DOWN AND ALTERNATOR PROTECTION EQUIPMENTS

7.3.1 Following shut down and protection system shall be integrated in the control panel.

- a. Engine shut down for:-
 - i) Low lube oil pressure
 - ii) High coolant (water) temp.
 - iii) Engine over speed.
- b. Alternator Protection:-
 - i) Over current and Earth fault aided suitable relays.
 - ii) Short circuit protection.

7.3.2 The above shut down and trip shall have visual and audible alarms.

7.4. MONITORING AND METERING FACILITIES

- a. Digital Voltmeter with selector switch for monitoring of mains and alternator voltage.
- b. Digital Ammeter with selector switch for monitoring of mains and alternator current.
- c. Digital Frequency meter for monitoring of mains and alternator supply frequency.
- d. KWH meter on the alternator side suitable for 3 phase 4 wire system.
- e. Visual monitoring lamp indication for:-
 1. Load on set
 2. Load on mains
 3. Set on test
 4. Engine shutdown due to over speed.
 5. Engine shut down due to low lube oil pressure
 6. Engine shutdown due to high coolant water temperature.
 7. Over Load trip of alternator
 8. Earth leakage trip of alternator
 9. Engine lock out and failure to start

All these indication shall have an audible alarm and when energized shall blink and trigger the audio alarm, until annunciation accepted by the operator. When operator accepts the alarm, the hooter will be silenced and the fault indication will became steady until reset by operating the reset button.

- f. Number of starts meter.
- g. RPM cum running hours meter.

7.5 OPERATION DEVICES

A set of operating devices described as under shall be incorporated in the front of panel.

- a. Master Engine control switch:-

This shall cut off DC control supply to the entire panel in OFF position thus preventing the engine to startup of engine due to any cause under this status. However battery charger, lamp test button for testing the healthiness of indication lamp, DC Voltage/Ammeter etc shall be in operative condition. It shall be feasible to lock the switch in OFF position for maintenance and shut down purpose.
- b. Operation Selector Switch:-

It shall consist with OFF/mains/Test positions.
- c. Selector Switch:-

For all metering instruments as specified.
- d. Push buttons:-

A set of push buttons as specified.
- e. Charger system:-

Trickle/boost charger selector switch.

7.6 BATTERY CHARGER

This shall be complete with BOOST/TRICKLE selector, DC voltmeter, DC ammeter and lamp indications for healthy mains, boost charge and trickle charge.

8. DRAWING AND MANUALS

Technical data A and all the drawings and calculation shall be submitted for approval and statutory approval of CEA shall be obtained for commissioning of the Diesel Generator set.

9. TESTS:-

9.1 FACTORY TEST

Complete tests at full load and 10% over load shall be carried out at the manufacture's works to determine the performance and operating characteristics of the assembled generating set and accessories to determine whether or not the guarantees have been met. Unless otherwise specified, all routine tests shall be carried out in accordance with the standards and shall be witnessed by the representatives of the purchaser. Manufacturer test certificate with manual in triplicate shall be supplied by the vendor.

9.2. SITE TEST:-

After installation at site, the set should be tested for full load for eight hour.

10. TOOLS AND SPARES

The vendor shall supply all tools, normal and special required for operation and maintenance of the generating sets at free of cost as listed.

- a. Double End Spanner set - 1 set
- b. Adjustable spanner - 1 No
- c. Screw Driver 50 mm - 1 No
- d. Screw Driver 40 mm - 1 No
- e. Heavy Screw Driver - 1 No
- f. Hammer - 1 No
- g. Cutting pliers - 1 No
- h. Fuel Hand pump - 1 No
- i. Standard powder type fire extinguisher and clamped on wall - 1 No
- j. Fire bucket filled with sand - 4 No
- k. Rubber mat 2' x2' - 4 No
- l. 440V Danger Board fixed on wall - 1 No
- m. First Aid Box - 1 No
- n. Safety chart And first aid chart for electric shock in wooden frame with glass -1 set
- o. 210 Lts GI Barrels - 6 No
- P. Electric pumpset with hose for lifting fuel from barrel to tank -1 set
- q. Hand pumpset for lifting oil - 1set

11. OTHER APPLICABLE STANDARDS.

- (i) 3043/1987 - code of practice for earthing
- (ii) 4412/1981 -Specification for copper, wires for general engineering purpose.

- (iii) 5216/part I & part II /1982 guide for safety procedure and practice in electrical work.
- (iv) 2551/1982 - Danger notice boards.

ANNEXURE - I

ALL INSTALLATIONS SHOULD BE WITH A REPUTED MAKE/BRAND AS BELOW:

EQUIPMENTS	ANY REPUTED MAKE LIKE,
1. DIESEL ENGINE	KIRLOSKAR, CUMMINES, CATTER PILLER etc,
2. ALTERNATOR	STAMFORD/KIRLOSKAR/ CROMPTION etc,
3. Air Circuit Breaker	ABB/L&T/SIEMENS etc,
4. PROTECTION RELAYS	SIEMENS/ABB/ALSTHOM/L&T etc,
5. AUXILIARY RELAYS	ALSTHOM/SIEMENS/ALLEN BRADLEY/L& T etc
6. INSTRUMENTS	RISHAB/ENERGON/MECO etc
7. CT / PT	KAYCEE/SILKAANS/INSTRANS/AE etc
8. CONTROL SWITCH/INDICATION	SIEMENS/TEKNIC/KAYCEE/L&T LAMP PUSH BUTTON etc
9. MCB	LEGRAND/SIEMENS/L&T etc
10. BATTERIES	AMCO/EXIDE etc
11. XLPE INSULATED PVC SHEATHED	HAVELLS/GLOSTER/UNIVERSAL etc
ALUMINUM CONDUCTOR	FINOLEX/POLYCAB etc
ARMOURED UG CABLE (ISI marked)	
12. ANTI-VIBRATION MOUNTING FOOT	DUNLOP etc

SECTION – IV
SCHEDULE OF WORK

Name of the work: Provision of 500 KVA Diesel Generator at IGGGH & PGI Puducherry.

Sl No	Description	Qty	Rate	Amount
1	Supply, installation, Testing and commissioning of factory assembled AMF type Diesel Gen. set of 500 KVA,400KW,50Hz, 0.8PF, 1500RPM with acoustic closure as per CPCB norms consisting of the following:- a) Water cooled diesel engine with electric starting equipments, batteries with leads etc., complete with accessories as detailed in technical specifications. b) Common bed with 'Cushy foot' anti-vibration mounting as required. c) Alternator of suitable capacity suitably coupled to the engine as per detailed technical specification. d) Piping and pumping work required for fuel system including all accessories	1 job		
2	Supply, installation, testing and commissioning of factory manufactured microprocessor based AMF control panel made out of 2 mm thick M.S. sheet with 2 no.of 800 A ,4 pole, AC Breakers with OC/SC/EF protection for Main and Gen set incoming ,battery charging arrangement, over speed, low lube oil pressure, high cooling water temperature, fuel shut off, adequate capacity copper bus bar suitable for termination of 2 no. of outgoing UG cable automatic engine starting and stopping complete as per detailed specification as required.	1 job		
3	Supply and installation of exhaust piping with 150 mm Dia M.S. class 'B' pipe including hardware like flange, bends, bolt & nuts, gasket, support etc. as required.	10 mt		
4	Providing of earth pits with 300x300 x6mm copper plate, 40 x 6 mm copper flat and suitable size copper clamp connecting earth leads and perforated 40 mm G.I. pipe and providing masonry enclosure with cover plate having lacking arrangements and watering pipe.	4 sets		
5	Supply and running of 25 x 6 mm copper flat in ground at a depth of one feet and connecting with earth electrode for neutral & body earth.	120 mt		

6	Supply and laying of 3 ½ x 300 sq. mm Aluminum armoured UG cable from DG set to AMF panel, metering panel to AMF panel and AMF panel to distribution.	120 mt		
7	Supply and making end termination of 3.5x300Sq.mm aluminum armoured cable with brass compression gland and aluminum lugs	10 sets		
8	Supply and laying of sensing cable with 2.5 sq. mm copper multi stranded copper cable for looping cable & necessary glands etc.	20 mt		
	TOTAL			
	(Rupees.)			

Signature :

Name :

Status :

Whether Authorized
attorney of Tendering
Company :

Name seal of the Tendering
Company :

Place:

Date:

SCHEDULE – A

SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS

SL.NO	DETAILS OF PARTICULARS	REMARKS
1)	ENGINE:- <ol style="list-style-type: none">1. Make2. Model No3. Type4. No. of Cylinders5. Arrangement of Cylinders6. Bore and stroke7. RPM8. Method of starting9. Fuel injection type10. Aspiration method11. Lubricating oil system12. Time required for starting from cold13. Type of Governor14. Fuel oil recommended15. lubricating oil recommended16. LMP at site at output shaft/coupling17. Over load capability<ol style="list-style-type: none">i) Full loadii) Half loadiii) No load18. Mechanical efficiency	

19. Fuel Consumption per hour

i) Full load

ii) $\frac{3}{4}$ load

iii) $\frac{1}{2}$ load

iv) No load

20. Standard mounting accessories on engine
(furnished details as Annexure)

21. Safety shut downs provided

22. Direction of rotation

23. Type of cooling and sump capacity

24. Oil (type & Quantity)

25. Any other data

II) ALTERNATOR:-

1. Make

2. Model No

3. Type

4. Governing specifications

5. a) Full load output in KVA

b) Full load output in KW (at 0.8 PF)

6. Enclosure

7. Speed/frequency

8. No. of phases

9. Is neutral brought out

10. Voltage between phase/neutral

11. Regulated band of voltages

12. Current carrying capacity of winding
13. percentage imbalance permissible
14. Permitted over load capacity(maximum)
15. Short time over load
16. Efficiency
17. Temporary over load after full load run for 12 hours
18. Excitation method
19. Excitation amps at full load
20. Excitation Voltage
21. Air gap between stator and rotor
22. Exciter type

III) GENERAL

1. Length of set (over all) & width (over all)
2. Weight of set (over all)
3. Head room needed for lifting/servicing
4. Weight of Alternator
5. Weight of engine
6. Direction of rotation
7. Standard accessories
8. Radiator (make and type)
9. Fan dia
10. CFM of fan and static pressure
11. RPM of fan/type of drive
12. HP absorbed by fan
13. Capacity of daily service tank

14. Size of service tank

IV SOUND PROOF ACOUSTIC ENCLOSURE

1. OVERALL DIMENSIONS

2. Material / Composition of the panels

3. Thickness Top/ Bottom/Side

4. Panel dimensions

5. Door dimensions

SCHEDULE OF DEPARTURE FROM SPECIFICATION

Sl.NO	Description of Departure	Reference clause of the Specification	Reasons departure and advantage
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“Barring the departure listed out in the schedule of departure we certify that our offer complies with requirement of your tender specifications fully”

Place:

(Signature of Tenderer)

Date: