



**NATIONAL INSTITUTE OF TECHNOLOGY,
Tiruchirappalli, Tamil Nadu, India.**

Enquiry No:

**NITT/EMD/2012/DG Sets/
Dt 17-09-12**

**Pre bid
meeting**

28/09/2012,03:00PM

Due date

08/10/2012,03:00PM

**Supplier Qtn
No**

**Supply,Installation,Testing and Commissioning of Four Numbers
of 3 phase 500 kVA / 400 kW,415 V,50 Hz DG sets**

Part -1

Technical Bid for DG Sets

1. The "Offer" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/ requirements shall be treated as non-compliance.

2. The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE SUPPLIER :

TELEPHONE NOS.:

FAX NOS.:

E-MAIL ADDRESS :

| Part 1 | Bill of Quantities for Supply, Installation, Testing, Commissioning outdoor unit of four numbers of 500 kVA / 400kW , 415 V,50 Hz Diesel Generator at National Institute of Technology ,Tiruchirappalli,- 620 015 | | | |
|--------|--|-----------|---------|---------|
| Sl.No | Description - NITT's Requirement | Specified | Offered | Remarks |
| | SCOPE: | | | |
| 1 | GENERATOR SETS , | | | |
| | General :Supply ,installation ,testing and Commissioning of 500 kVA/400kW, 415V,50 Hz Diesel Generator set Complete with all accessories like engine ,alternator,batteries with leads,automatically sensing control panel ,base frame,antivibration mounts, Hospital / residential silencer,minimum 700 litres fuel tank,intake &exhaust piping, motor operated fuel oil pump,other miscellaneous accessories for the total set including test trial run for 8 hours at full load (inclusive of consumable oil etc) control wiring, annunciation etc as per specification given below. | | | |
| 1.1 | Supply : | | | |
| | DIESEL ENGINE | | | |
| 1.1.1 | Make : Cummins/Caterpillar / Mitsubishi /Perkins/MTU/Kirloskar | | | |
| 1.1.2 | Model | | | |
| | 600 BHP diesel engine, 6 cylinders, water cooled, turbocharged after cooled, suitable for generating set application @ 1500 RPM under NTP conditions of BS:5514, with an overload capacity of 10% for one hour in any 12 continuous hours operation:The engine shall be complete with the following accessories: <ul style="list-style-type: none"> • Radiator with blower fan • Corrosion inhibitor coolant• Paper element filters- fuel, lube oil and bye pass• Flywheel housing and flywheel suitable for single bearing alternator • Engine bearing mechanism in flywheel housing • Flexible coupling • Dry type air cleaner and vacuum indicator• Residential / Hospital silencer • Stainless steel exhaust flexible bellows• Electric starter• Battery charging alternator <ul style="list-style-type: none"> • Digital Genset controller:Microprocessor based governing, regulation, metering,monitoring,and synchronization control system,AMF control panel,Battery charger,Remote / auto start panel/auto /manual synchronizing panel and audio /visual annunciation for faults.The engine shall be continuous rated ,suitable for single bearing alternator . | | | |

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| | The Fuel consumption at 75 % load with Radiator and fan should not be greater than 77.4ltr / hr and at 100 % load Radiator and fan 101.8 ltr / hour .The controller shall have a facility to monitor the engine through computer. | | | |
| 1.1.3 | Cooling system: radiator cooled engine, mounted blower fan , engine mounted water pump, and thermostat.Initial filling of corrosion inhibitor coolant by vendor | | | |
| 1.1.4 | Fuel system : Minimum 700 ltr capacity fuel tanks with connected pipelines/hoses, for fuel tank , over flow pipes ,drain valves, air vent valves,strainers openings for inspection and cleaning with cover ,level indication in the tank with scale to indicate the fuel stored and Digital fuel Level indicator , Diesel consumption meter,common outlet of tank should be connected to engine, full flow spin-on filters to the engine, fuel pump, injectors. Initial filling of fuel (high speed diesel)in NITT scope . | | | |
| 1.1.5 | lubricating system : oil pump, strainer, spin-on filter, pipes ,intimate lube grade , capacity of sump,intial filling of lube oil by vendor . | | | |
| 1.1.6 | Air intake System: Dry Type Filter, Air manifold with nessary connections,turbo charger with after cooler. | | | |
| 1.1.7 | Exhaust system : Dry type filter ,air manifold with necessary connection ,turbo charger with after cooler,heat resistance epoxy painting coat on pipe, insulation and hanger , support structure starting from engine to side DG room (aluminium cladding, chicken mesh mineral wool up to canopy, etc), provision for temperature and pressure, test and measurement for checking compliance with statutory requirement . | | | |
| 1.1.8 | PCB: stack of required height as per PCB norms has to be provided. Emission shall be within norms specified by Pollution control board and environment protection rules . Room design to be given by vendor.Room construction by NITT . | | | |
| 1.1.9 | Governing system : Electronic governer controller / class | | | |
| 1.1.10 | Starting System : DC starter motor , battery charging alternator with built in regulator, suitable stand,suitable numbers of charged 2 X12 V,180 Ah batteries , with cable leads and terminal holders. Battery make : Exide/ Amaron/cummins pulse / amco/ HI Power | | | |
| 1.1.11 | Spare parts of filters Includes Lube Oil , Fuel& Air filter to be replaced up to 1000 hours at free of cost whenever required. | | | |

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| 1.1.12 | Motor driven prime pump for lube oil | | | |
| 1.1.13 | Cylinders in the Engine is Maximum of 6 Numbers | | | |
| | Fly wheel housing,flexible coupling,coupling guard, Base frame : sturdy,fabricated, welded construction, channel iron frame for mounting the engine and alternator . | | | |
| | Battery charger from mains 230V AC | | | |
| 1.1.14 | AVM pads :Set of foot mounting pads | | | |
| 1.1.15 | Accoustic Enclosure : Suitable acoustic enclosure (CPCB)approved | | | |
| | <p>Technical Specifications :</p> <p>The acoustic enclosure to house Diesel Generating Set and radiator.</p> <p>The vendor to guarantee noise level of the treated enclosure as 75 db at 1 meter distance at 75% Load or 65 db at 75 % Load at 3 meter distance</p> <p>The enclosure shall have two heavy duty steel hinged door with acoustic air inlet and outlet. The size of the inlet and outlet shall be adequate enough to suit the engine performance.</p> <p>The acoustic treatment to the enclosure shall be done using glass/mineral wool of density at level 64 and minimum 150x100 crown is to be provided on the walls and ceiling of the diesel generating enclosure.</p> <p>All the acoustic panels will be mounted on a suitable sized frame works fabricated using minimum 75 x 75 x 6 mm angles which will be fixed to the walls with necessary anchor bolts/ hardware.</p> <p>The Vendor to complete the acoustic calculations as required to be carried out by the vendor and if it is established that blowers/axial flow fans of adequate capacity are required to be put then the same shall be provided by the vendor at no extra cost to the owners.</p> <p>The vendor has to further ensure that the inside temperature of the Enclosure does not rise by more than the permitted level by the engine and alternator manufacture.</p> <p>The Acoustic panels shall be fabricated in such a manner that it should be possible to remove any of the Generating set component including engine and the alternator from the acoustic enclosure by dismantling the relevant acoustic panels without disturbing the other set.</p> | | | |

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| | <p>All the panels should undergo seven tank painting process and all the panels shall be powder coated of approved color by the Architects. The acoustic Enclosure shall be totally weather, vermin and dust proof to enable the generator to operate on ambient temperature of 40° C.</p> <p>The doors shall be preferably of 2.4 m height and 1.2 m width or any other suitable dimensions as approved by consultants.</p> <p>The doors shall have automatic lock, pad locking, at the top to prevent rain water entry etc.</p> <p>The interior (sides and top) of the shell shall have stiffeners at regular interval made out of 20 SWG M.S. sheet steel of folded type and welded rigidly with the outer shell. Blanket form glass wool (crown 150 x 100) to be laid in the interval surface and covered with 22 SWG aluminum perforated sheet. The aluminum perforated sheet shall be screwed to the stiffeners. The stiffeners shall be placed closely to each other to avoid buckling of perforated sheet.</p> <p>The acoustic enclosure shall have dust tight opening to take out the residential type silencer with proper support and brought out of the enclosure on the top. The Exhaust gas shall be let out in the atmosphere in the manner specified by the CPCB Norms.</p> <p>The total acoustic enclosure panels shall be made up of minimum 16 SWG MS sheets and properly treated with seven tank process using pickling, passivation, rinsing, and de-rusting processes and finally coated with Zinc coated primer and finished with approved shade of enamel paint.</p> <p>The acoustic enclosure shall also have to mount exhaust fans of appropriate sizes. The size and the quantity of the exhaust fans for removing the heat from the acoustic enclosure shall be decided by the vendor.</p> <p>Any other requirement as per Engine/Alternator manufacturer's requirements and / or meeting the standards as laid down by Central Pollution Board with latest amendments to suit the site conditions etc. to be complied with.</p> <p>The relevant tests should be carried out for Acoustic enclosure.</p> | | | |

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| 1.2.0 | ALTERNATOR : | | | |
| 1.2.1 | Standard design alternator, suitably rated at 500kVA/400kW at 0.8PF(lag), 415V, 3 phase, 4 wires, 50Hz, 1500 RPM, self excited ,self regulated, with brush less excitation, band of voltage regulation +/-1.0% of rated voltage, from no load to full load. Insulation class H. The alternator generally confirms to BS: 5000/IS: 4722. Make :STAMFORD/ CROMPTON/ KIRLOSKAR | | | |
| 1.2.2 | Any other description | | | |
| 1.3.0 | UG Cables: 3.5 x 400 sq mm- 300m | | | |
| 1.3.1 | Supplying ,Excavation,Laying,Termination of 3.5 400 UG Sq xlpe Aluminium armoured cable 1100 V Rating Make of cables : Poly cab / Gloster/ Finolex/CCI | | | |
| 1.3.2 | AMF Panel The Control panel shall be made of 14 & 16 SWG sheet steel mounted on a channel frame, floor mounting, free standing, dust proof, cubical type front operated etc. It shall be provided with 2 numbers of 1000A ,4 pole ACB (EDO) as detailed in technical bid with U/V coil and thermal magnetic release,current transformers with suitable ratio for metering and protection, earth fault relay, square digital type ammeter (0 – 800A), square digital type voltmeter (0 - 600V), auto / manual test selector switch, digital type frequency meter, kW meter,kWh meter, pf meter, indicating lamps, fuses etc.The annunciation shall be as per control panel etc.The annunciation shall be as per control panel specification. The panel shall be equipped with a sensing relay to sense the low and high voltage conditions,including the failure of power supply, give command to the DC motor engine cranking, built in adjustable timer and sensing relay for three consecutive starts with failure to start indication at panel, panel illuminating lamp, timer and relay sensing devices to stop the engine after resumption of power supply. The panel shall be equipped with tinned copper bus bars of suitable size, duly provided with heat shrink PVC sleeves mounted on suitable support insulators. Separate bus bars for incoming and outgoing with cable entry at bottom / top of panel with removable gland plate separately for incoming and outgoing cables, panel lifting hooks, base frame etc. | | | |

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|-------|--|-----------|---------|---------|
| 1.3.3 | Battery charger comprising of a) Transformer, b) Rectifier ,c) DC Ammeter, d) DC Voltmeter, e) Charging rate selector ,f) Circuit Breaker | | | |
| | All Control cables & other wiring are in the scope of the vendor | | | |
| 1.3.4 | Battery Voltage sensing & monitoring and Charging Current | | | |
| 1.3.5 | Any other description | | | |
| 1.3.6 | Push Buttons for manual start /stop | | | |
| 1.3.7 | Manual test - mode selector switch | | | |
| 1.3.8 | Annunciation,Alarms & Trip Features | | | |
| | Indications for DG "ON/OFF" | | | |
| | Indications for MAINS "ON" for load | | | |
| | Indications for Over Current & Earth Fault | | | |
| | Coolant temperature | | | |
| | Low oil pressure | | | |
| | RPM indication | | | |
| | Service hour meter | | | |
| 1.3.9 | Protection | | | |
| | High water temperature | | | |
| | Low lube oil pressure | | | |
| | Over / Under speed | | | |
| | Air filter Clog Indicator | | | |
| | Starting failure | | | |
| | Generator overload | | | |
| | Battery voltage low | | | |
| | Others | | | |
| 1.4 | EARTHING : 4 Numbers / Set | | | |
| 1.4.1 | Earthing as per the ISI specification with an earth electrode of 2.1 m class 'B' GI pipe of diameter not less than 40mm, with copper earth plate of size 125mm x 50mm x 6mm with necessary funneling arrangements, masonry work and with 40mm RCC cover / CI cover slab for the brick masonry. | | | |

| Sl.No | Description - NITT's Requirement | Specified | Offered | Remarks |
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| 1.4.2 | Plate Earthing with copper plate of size 600mm x 600 mm X 3 mm as per the ISI specification with an earth electrode of 2.1 meter class 'B' GI pipe of diameter not less than 40mm, with copper earth plate of size 125mm x 50mm x 6mm with necessary funneling arrangements with necessary masonry work and with 38mm RCC cover slab for the brick masonry.GI strip for DG set body earthing, copper strip for neutral earthing. | | | |
| 2 | TOOLS FOR OPERATION & MAINTENANCE: | | | |
| 2.1 | Standard tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the DG Set should be supplied. List of such tools should be submitted with offer. | | | |
| 3 | SPARES: | | | |
| | Item wise breakup of mandatory mechanical & Electrical spares as per the requirement for 5 years of trouble free operation should be offered by vendor. | | | |
| | (Unit Price of each item of spare should be offered) - See Part 2 | | | |
| 3.1 | Complete list of spares for operation and maintenance of Four DG Sets and accessories, along with specification / type / model, and name | | | |
| 3.2 | Operating & maintenance Manuals & spare parts manual for the Diesel Engine | | | |
| 3.3 | Operating & maintenance Manuals for the Alternator | | | |
| | General arrangement plan of DG set. | | | |
| | Piping schematic diagram and engine control electrical circuit | | | |
| | Operation & Maintenance Manual for Batteries | | | |
| | Providing E log book for DG Sets | | | |
| | One additional set of all the above documentation on CD ROM, wherever possible. | | | |
| 4 | ERECTION & COMMISSIONING at NIT,Tiruchirappalli | | | |
| 4.1 | Supplier shall be responsible for carrying out the Erection, start up testing and commissioning of the new DG Set. Required technical personnel and labour required for the same shall be provided by the vendor. Tools and tackles , any required for the same shall be a arranged by the vendor. Service requirement like power, air & water shall be provided by NITT at free of cost. | | | |
| 4.2 | Erection of the stack and thermal insulation of the exhaust system is also the responsibility of the vendor. | | | |

| Sl.No | Description - NITT's Requirement | Specified | Offered | Remarks |
|------------|---|-----------|---------|---------|
| 5 | OPERATING CONDITIONS : | | | |
| | The DG Set should work trouble free and efficiently under following operating conditions: | | | |
| | Height above MSL: 195 m | | | |
| | Ambient Conditions: Temperature = 20 to 50 degree Celsius | | | |
| | Relative Humidity = 95% max. | | | |
| | Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. | | | |
| 6 | APPLICABLE CODES & STANDARDS: | | | |
| | Rating Definition as per ISO 3046 / BS 5514 | | | |
| | IS 4722 | | | |
| | BS 5000 | | | |
| | IEC 34/1 | | | |
| | ISO 8528,IS- 4889, 10000, 10002 | | | |
| | Pollution Control Board directives with regard to exhaust stack height | | | |
| | Fuel conforming to IS 1460 | | | |
| | Fuel consumption tolerance as per BS 5514 | | | |
| | Environmental Protection Rules | | | |
| 7 | Tests/Activities to be carried out at supplier's works in the presence of NITT Engineers before dispatch : | | | |
| 7.1 | Verification of Original test certificates for engine, alternator, room enclosure, and all other bought out items. | | | |
| 7.2 | Test run of DG Set | | | |
| 7.3 | 8 Hour Run Test :Trial run of DG Sets with consumables (including,first Charging of Lubricating Oil and nessary fuels) for 8 hours at full Load | | | |
| 8 | Inspection &Test /Activities | | | |
| | Inspection will be done by NITT before despatch,the Vendor shall arrange facilites &Test /Activities | | | |
| 9 | Test /Activities to be carried out at NITT works while commissioning the DG Set: | | | |

| Sl.No | Description - NITT's Requirement | Specified | Offered | Remarks |
|-------|---|-----------|---------|---------|
| 10 | Foundation: | | | |
| | Vendor shall provide drawing for foundations ,control room and fencing with offer. | | | |
| 11 | Fire Fighting Equipments | | | |
| | Direct Quick Reponse System shall be installed in the Acoustic enclousre. | | | |
| 12 | Warranty | | | |
| | The DG set shall be waranted for a period of 24 months from the date commissioning or 5000 running hours from the date of commissioning whichever occurs earlier. | | | |
| 13 | Approval from Statutory Authority | | | |
| | Getting Approval from Statutory Authority like SEB, CEIG,CEA,CPCB etc.is in the scope of the vendor | | | |

| Part -2 | LIST OF APPROVED BRANDS/MAKES OF EQUIPMENTS REQUIRED UNDER THIS TENDER | |
|----------------|--|-----------------------------|
| | The following are the list of approved brands/ makes of equipments required under this tender. Please note that wherever there is a multiple choice of brands/makes approved, any one make as selected by the NITT will have to be supplied by the Vendor without any extra cost to the NITT. No deviation in this will be accepted by the NITT. | |
| SL No | Description | Approved Makes |
| 1 | Low Tension, 415 V ,AC , Air Circuit Breaker 4 Pole | Schneider /Siemens/ABB/L&T |
| 2 | Low Tension, Molded Case Circuit Breaker, | Schneider /Siemens/ABB/L&T |
| 3 | LED Type Indicating Lamps with Color LED. | Schneider /Siemens/L&T |
| 4 | Selector Switches for Ammeter / Volt meter | Schneider /Siemens/L&T |
| 5 | Analog type Ammeters / Volt meter | IMP/AE/Rishabh |
| 6 | Anolog Power factor ,Frequency meter | IMP/RISHABH |
| 7 | Relays | Schneider /Siemens/ABB |
| 8 | FRLS Panel wires, in color in 660/1100 Volts ,grade. (Unilay Construction) | LAPP/ R.R. KABEL /POLYCAB |
| 9 | Lugs, Crimping type, tinned copper heavy duty only. | JENSON/LAPP |
| 10 | Station type, Push Button in different color code | SCHNEIDER/L & T /SIEMENS |
| 11 | Terminal Blocks, Clip on type. | WAGO/LAPP |
| 12 | MS fabricated Panels | AS APPROVED BY NITT |
| 13 | Starters/Contactor/Timers. | L & T/SIEMENS / ABB |
| 14 | Miniature Circuit Breaker of 10 kA Breaking Capacity and Boards. | L&T/SIEMENS / ABB |
| 15 | CT - 660 V grade ABS CASINGS | RECO/KAPPA |
| 16 | HRC Control fuses with bakelite/type Moulded fuse holders. | ABB/BUSSMAN/ SIEMENS /L & T |

| SL No | Description | Approved Makes |
|--------------|-----------------------------|--|
| 17 | Terminal Blocks Clipon type | ELMEX/WAGO/ CONNECTWELL |
| 18 | DG SET- ENGINE | Cummins/Caterpillar /Mitsubishi /Perkins/MTU/Kirloskar |
| 19 | ALTERNATOR | STAMFORD/ CROMPTON/ KIRLOSKAR |
| 20 | . BATTERIES | Exide/ Amaron/Cummins pulse / Amco/ HI Power |
| 21 | Any other items | Sample for approval of the NITT |

| Part -3 | Price Schedule for supply of mandatory spares for 5 Years of operation & Maintenance spares for four Numbers of 500 kVA, 415 V DG Sets, AMF and Generator Controls. | Quantity |
|---------|---|------------|
| 1 | Oil Filter | 18 |
| 2 | Fuel Filter | 48 |
| 3 | Nozzle | 8 |
| 4 | Gasketes | 8 |
| 5 | Belts | 12 |
| 6 | Air Filter Elements | 8 |
| 7 | Pressure switch | 4 |
| 8 | Temperature Switch | 4 |
| 9 | AVR set | 2 |
| 10 | Indicating Lamp | 50 |
| 11 | Main Electronic card | 2 |
| 12 | Expansion / Auxilary card | 2 |
| 13 | Fuses of Each Type | 4 Sets |
| 14 | Diodes and Suppressor | 4 Sets |
| 15 | Solenoid coil for fuel oil System | 8 Sets |
| 16 | Stop relay | 4 Sets |
| 17 | Oil | 200 litres |
| 18 | Coolant | 200 litres |
| 19 | Other necessary spares | |

Vendors signature with Seal

| Sl.No | Description - NITT's Requirement | Qty |
|----------------|--|----------|
| Part -4 | Price Schedule for Operation and Annual Maintenance Contract (Non Comprehensive) | |
| | Scope of AMC: AMC shall include greasing, oiling, replacement of filters, like air filter, oil filter, fuel filter etc periodically as per norms prescribed by the Engine Manufacturer. | |
| 4.1 | AMC for the 1st year after the warranty period/D.L.P of two years.[Third year after installation] | 4 |
| | AMC for the 2nd year after the warranty period/D.L.P of two years.[Fourth year after installation] | 4 |
| | AMC for the 3rd year after the guarantee period/D.L.P of two years.[Fifth year after installation] | 4 |
| 4.2 | Operation of DG Sets | |
| | Operation of DG Sets 06.00 PM to 06.00 AM, 12 Hours/day in different locations. | |
| | Operation of DG Sets during whenever power failure between 06.00PM to 06.00 AM and Maintaining DG sets, Maintaining the Log book of the Engine parameters, AMF panel parameters. | |
| | Diesel transporting and Diesel level Maintaining Minimum 75 % of the diesel tanks.(Diesel & vehicles are NITT's scope). | |