Indian Institute of Integrative Medicine

(Formerly known as Regional Research Laboratory)

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TENDER NO: 06(212)/19-P Date 05.02.2020

TENDER DOCUMENT

FOR

Supplying, installation, testing and commissioning of 250 KVA DG set

INVITATION TO BID

File No. 06(212)/19-P Date 05.02.2020

Dear Sirs/Madams

Sub: Quotation for supply of "Supplying, installation, testing and commissioning of 250 KVA DG set" "

Ref: Our Enquiry No. 06(212)/19-P dated: 05.02.2020

Director, CSIR – Indian Institute of Integrative Medicine herein after called as the **'Purchaser'** is interested in the purchase of below mentioned material (s).Kindly send your quotation so as to reach us on or before **18.02.2020 by 3.00 PM hrs. (IST).**

Sr. NO.	Description of Item(S)	Quantity
1.	**250 KVA DG Set** **Supplying, installation, testing and commissioning of silent type 250KVA DG Set with AMF Panel, Bus Trunking /cables from DG set to essential panel, control cable, Earthing panel, DG set exhaust piping as per CPCB latest norms, civil Foundation work and minor allied works. The equipment to be installed at IIIM Br Lab, Srinagar. Make: Reputed Brands Note; The cost has been arrived as per latest CPWD Non Schedule rates- 2014 (attached herewith) i.e Rs 10,000/= per KVA**	1 No.
	Detailed Specification: please refer to ANNEXURE-I	

Last Date for submission : 18-02-2020 up to 3.00PM. hrs. (IST)

Date of Opening : 19-02-2020 at 3.00PM hrs. (IST)

TERMS & CONDITIONS

1. The quotation must be in the form furnished by the Purchaser and should be free from corrections/erasures. In case there is any unavoidable correction it should be properly attested. If not the quotation will not be considered. Hand written Quotations will not be considered.

2. It may kindly be noted that your bid should

A) be in **Two Cover Bidding**
B) accompany No Bid Security

3. Each quotation must be sent electronically in single cover through e-procurement portal (etenders.gov.in)

4. The acceptance of the quotation will rest with the competent authority of Indian Institute Of Integrative Medicine Jammu, who does not bind himself to accept the lowest quotation and reserves the right to himself to reject, or partially accept any or all the quotations received without assigning any reason.

5. Price quoted should be net and valid for a minimum period of 120 days from the date of opening of the quotation.

6. The bidder must submit the applicable Price Schedule Form as Annexed to the tender document available on the website.

7. **Complete specification with manufacturer's name and address should be given while quoting. Literature/Pamphlets should also be enclosed wherever applicable.**

8. Prices are required to be quoted in units indicated in the enquiry. When quotations are given in terms of other units, relationship between two sets of units should be furnished. Quantity discounts, if any should also be indicated. The items should be quoted indicating the serial No. of our RFQ.

10**.** In cases of agents quoting on behalf of their foreign manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorize only one agent/dealer. There can be only one bid from the following:

1. The foreign manufacturer directly or through one Indian agent on his behalf; or
2. Indian/foreign agent on behalf of only one principal.

11. Please indicate the name and address of the agents in India if any, the details of service to be rendered by them & the percentage of commission payable to them. **Agency commission payable to the Indian Agent should be clearly indicated**. The Agency commission would be payable only in Indian Rupees after acceptance.
12. This lab/Instt Is registered with Dept. of Scientific & Industrial Research, Govt. of India and concessional customs duty and GST & IGST are leviable vide notification no. 54/2002-Customs on all imports covered under notification No.51/96-Customs dated 23.07.1996, Notification No.47/2017-Integrated Tax (Rate) and Notification No.45/2017-Central Tax (Rate) both dated 14th November, 2017.

13. The mode of dispatch/transportation of the items must be by ***Air/Sea/Rail/Road only. (Retain one only).***

14. In case the items in the enquiry are covered by any rate contract or running contract finalized by any other state or central Government, it should be specified in your quotation and accepted contract rates should also be mentioned.

15. Delivery period required for supplying the material should be invariably specified in the quotation. The offered delivery period shall have to be strictly adhered to in case an order is placed.

16. Liquidated Damages Clause for delays: The applicable rate is 0.5% per week and maximum deduction is 10% of the contract price.

17. If the deliveries are not maintained and due to that account the purchaser is forced to buy the material at your risk and cost from elsewhere, the loss or damage that may be sustained there by will be recovered from the defaulting supplier.

18. All supplies are subject to inspection and approval before acceptance. Manufacturer warranty certificates and manufacturer/Government approved lab test certificate shall be furnished along with the supply, wherever applicable.

19. TDS would be recovered as per rules in case of Fabrication/ Servicing/ Maintenance jobs/Installation charges etc.

20 Kindly furnish your PAN & GST Number etc. in your quotation for our records.

21 Our normal payment terms are 100% (hundred percent) within 30 (thirty) days on receipt and acceptance of material at our site in good condition. Please inform your Bank details for RTGS payment.

22. All disputes shall be settled in the courts of Jammu (J&K) Jurisdiction only.

23. Tender conditions (printed on the reverse), if any, or otherwise sent along with the tender shall not be binding on us.

24. All the above instructions and our standard terms and conditions must be complied failing which your offer may be liable for rejection.

25. As per Govt. of India procurement policies,

a. The purchaser intends to give purchase preference to local suppliers* in case the cost of procurement is in the range of more than Rs 5.00 lakhs and up to Rs. 50.00 lakhs.

b. There is no restriction on the eligibility of the suppliers. (**retain any one only)**

c. The procuring entity intends to give purchase preference to products/goods manufactured by micro, small and medium enterprises.

*"Local supplier" means a supplier or service provider whose product or service offered for procurement meets the minimum local content as prescribed in DIPP Order No.P-45021/2/2017-PP (BE-II) dated 28th May, 2018 or by the competent Ministries/Departments in pursuance of this order.

'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the items procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

26. Instructions to Bidders, General Conditions of Contract applicable to limited tenders originating from S&P Division along with different formats can be viewed on our website http://www.iiim.res.in under the heading tenders.

Yours faithfully,

Sd/-

Store & Purchase Officer

ANNEXURE – I

SPECIFICATIONS FOR 250 KVA (200 KW) SILENT TYPE DG SET

SCOPE OF WORK

The scope of work mainly includes but not necessarily limited to the following:

Supplying, installation, testing and commissioning of Diesel Generator set complete with base plate, anti-vibration isolators acoustic enclosure and all fixing accessories as required.

Exhaust piping, duly insulated with mineral wool and aluminum sheet cladding.

Residential type silencer, complete with GI supports, brackets hardware etc.
Low Maintenance lead acid batteries with charging system.

Day oil tanks complete with supporting stand, all accessories, filters, valves, fittings level indicators, and level controllers with contacts.

MS pipes for fuel, and generator cooling system, including all valves accessories fittings, painting of pipes and supports etc.

Hoisting and handling facilities such as cranes, tools and tackles specially required for this kind of equipment and for lowering equipment wherever it is to be installed.

Providing of automatic mains failure panel complete with necessary controllers and switchgears Provide manufacturer's factory representative's services, including coordination and supervision Carry out performance testing and commissioning, cabling, earthing system, interconnections, AMF panel, first lube oil filling.

ASSOCIATED CIVIL WORKS

Following civil works associated with Power Generating set installation are included in the scope of this tender. These shall be executed by the agency in accordance with approved shop drawings

1.2.1 PCC Foundation
1.2.2 PCC basin & Supports

APPROVALS

It is the absolute responsibility of the DG set Vendor to carry out the work in accordance with

the regulations of the Indian Electricity Act, Fire Insurance Regulations, Local Electrical Inspecting Authorities, Pollution Control Board (PCB) and the Electricity supply authorities and to prepare and get necessary drawings approved. No extra cost will be admissible to the Vendor on this account, all those services shall be deemed to have been included in the unit rates

AMBIENT CONDITIONS

Rating of all equipment shall be appropriate for the conditions on the location where the equipment will be installed and operate. All the equipment shall be suitable for continuous equipment will be installed and operate. All the equipment shall be suitable for continuous

Ambient Temperature

Maximum :50 deg. C
Minimum :-10 deg. C

Note: All equipment shall give required output under the above conditions

TECHNICAL SPECIFICATION

1.1 GENERAL

This section deals with unloading procedures, location, standard capacities
and climatic conditions for DG set installation

1.1.1 Unloading

1.1.1.1 Genset should be covered with polyethylene or tarpaulin during installation to ensure that water does not enter inside

1.1.1.2 Spreader bar/spacer plate of suitable size may be required to avoid damages to Genset components

1.1.1.3 DG set with Acoustic enclosures are provided with lifting hooks

1.1.1 ***DG Sets with acoustic enclosure***

DG sets are required to be supplied with acoustic enclosure as per CPCB II norms. DG set with acoustic enclosure shall preferably be installed outside the building

1.1.2 Climatic Conditions

The output of DG Set shall work under following climatic conditions to be in conformity with CPCB approved type tests

(i) Outside Maximum Ambient Temperatures : 50Deg.C
(ii) Height above Mean Sea Level : 1600 Meter

(iii) RH : 50%

1.1.3 DG Set should be type tested for Noise and Emission norms/standards as per CPCB as per Appendix 'II' and Appendix 'III'of GSFEW Part VII (DG Sets-2006)

1.2 DIESEL ENGINE

Scope: This section covers engine rating, standard components of a diesel engine including exhaust piping.

1.2.1 Diesel Engine

1.2.1.1 *Engine Rating*

The engine shall be of standard design of the original manufacturers. It should be 4 stroke cycles, water cooled, naturally aspirated/turbo charged (as per manufacturer standard), diesel engine developing suitable BHP for giving a power rating as per ISO 8528- Part-1, in KVA at the load terminals of alternator at 1500 rpm at ambient temperature of 47ºC, for height at 1000 Meter above MSL and at 50% RH The engine shall be capable for delivering specified Prime Power rating at variable loads for PF of 0.8 lag with 10% overload available in excess of specified output for one hour in every 12 hours. The average load factor of the engine over period of 24 hours shall be 0.85 (85%) for prime power output The engine shall conform to IS;10000/ISO 3046/BS; 649/BS 5514 amended upto date

1.2.1.2 Necessary certificate indicating the compliance of the above capacity requirement for the engine model so selected along with compliance of Noise and Emission norms as per latest CPCB guidelines for DG set should be furnished from the manufacturers alongwith the technical bid. However DG set, manufacturers shall furnish certificate that the Enginefor theDG set complies with the CPCB Emission norms.

1.2.1.3 The engine shall be fitted with following accessories subject to the design of the manufacturer

(i) Dynamically balanced fly-wheel.
(ii) Necessary flexiblecoupling and guard for alternator and engine (applicable only for double bearing alternator)
(iii) Air cleaner (dry/oil bath type) as per manufacturer standard
(iv) A electronic governor to maintain engine speed at all conditions of load
(v) Daily fuel service tank fabricated from M.S. Sheet with inlet outlet connections air vent tap, drain plug and level indicator (gauge) M.S. fuel piping from tank to engine with valves, unions, reducers, flexible hose connection and floor mounting pedestals, twin fuel filters and fuel injectors. The location of the tank shall depend on standard manufacturersdesign.

(vi) Dry exhaust manifold with suitable exhaust residential grade silencer to reduce the noise level.
(vii) Suitable self starter for 12 V/24 V DC.
(viii) Battery charging alternator unit and voltage regulator, suitable for starting batteries, battery racks with interconnecting leads and terminals
(ix) Necessary gear driven oil pump for lubricating oil, priming of engine bearing as well as fuel

systems as per manufacturer recommendations.

(x) Turbo charger / after cooler (as per manufacturer standard)

(xi) Lubrication oil cooler
(xii) Lubrication oil filters with replaceable elements
(xiii) Crank case heater as per manufacturer recommendations.

(xiv) Fuel injection: Engine should have suitable fuel injection system in order to achieve low fuel consumption.
(xv) Fuel control solenoid.
(xvi) Fuel pump with engine speed adjustment.
(xvii) Engine Control Panel: fitted and having digital display for following:-
(a) Start/stop key switch.
(b) Lube oil pressure indication.
(c) Water temperature indication
(d) RPM indication.
(e) Engine Hours indications
(f) Engine Hours indications
g) Low lube Oil trip indication
(h) High water temperature indication
(i) Over speed indication.

(xviii) All moving parts of the engine shall be mechanically guarded in such a manner that a human finger cannot touch any moving part.

(xix) Radiator System or suitable as per OEM.
(xx) Any other item not included/specified, but is a standard design of the manufacturer.

1.2.1.4 ***Governor***

Electronic governor of class A1, as per ISO 3046/BS 5514 with actuator shall beprovided as per standard design of manufacturer. Governor shall be a self-contained unit capable of monitoring speed.

1.2.1.5 ***Frequency variation***

The engine speed shall be so maintained that frequency variation at constant load including no load shall remain within a band of 1% of rated frequency.

1.2.1.6***Fuel system***

It shall be fed through engine driven fuel pump. A replaceable element of fuel filter shall be suitably located to permit easy servicing. The daily service tank shall be complete with necessary supports, gauges connecting pipe work etc. In case of top mounted tanks, non return valves are must in fuel supply and return line of specified value. Pipe sealant should be used for sealing all connection. No Teflon tape is to be used. If piping length is more than 10 meters detail engineering required in consultation with OEM/Manufacturers

1.2.1.7 *Lubricating oil system*

It shall be so designed that when the engine starts after a long shut down lubrication failure does not occur. Necessary priming pump for the lub, oil circuit as per recommendation of manufacturer shall be installed, to keep bearings primed. This pump shall be normally automatically operative on AC/DC supply available with the set.

1.2.1.8 *Starting system*

This shall comprise of necessary set of heavy duty batteries 24VDC (as per manufacturer standard), and suitable starter motors and axial type gear to match with the toothed ring on the fly wheel. A timer in the control panel to protect the starter motor from excessively long cranking runs shall be suitably integrated with the protection system and shall be included within the scope of the work. Battery capacity shall be suitable for meeting the needs of starting system (as three attempt starting), as well as the requirements of control panel, indications and auxiliaries such as priming pump as applicable etc. The scope shall cover all cabling, terminals, including initial charging etc. The system shall be capable of starting the DG set within 20-30 seconds, even in winter condition with an ambient temperature down to 0ºC.

1.2.1.9 *Battery charger*

The battery charger shall be suitable to charge required numbers of batteries at 24 Volts complete with, transformer, rectifier, charge rate selector switch, indicating ammeter & voltmeter etc. Connections between the battery charger & batteries shall be provided with suitable copper leads with lugs etc.and system should be capable for trickle charging .

1.2.1.10 *Piping work*

All pipe lines, fittings and accessories requirement inside the room/enclosure and outside for exhaust piping shall be provided by the contractor. This shall include necessary flexible pieces in the exhaust, fuel, lub. oil and water lines as are necessary in view of the vibration isolation requirement in the installation. Piping of adequate size shall be used for lub. oil of the material as per manufacturer standard. However, only M.S. pipes for the exhaust and fuel oil lines shall be used.

The pipe work shall be inclusive of all fittings and accessories required such as bends, reducers, elbows, flanges, flexible connection, necessary hardware etc. The installation shall cover clamps, supports, hangers etc. as are necessary for completing the work. However, the work shall be sectionalized with flanged connections as are necessary for easy isolation for purposes for maintenance of unit as approved by Engineer-in-charge

1.2.1.11 *Common bed plate*

Engine and alternator shall be coupled by means of flexoplate/ flexible coupling as per manufacturer standard design and both units shall be mounted on a common bed plate together

with all auxiliaries to ensure perfect alignment of engine and alternator with minimum vibration. The bed plate shall be suitable for installation on suitable anti-vibration mounting system.

1.2.1.12 *Exhaust System*

1.2.1.12.1 ***Exhaust Piping***:- All M.S. Pipes for exhaust lines shall be conforming to relevant IS. The runs forming part of factory assembly on the engine flexible connections upto exhaust silencer shall be exclusive of exhaust piping item. The work includes necessary cladding of exhaust pipe work using 50mm thick glass wool /mineral wool/ rockwool, density not less than 46 kg/m² and aluminum cladding (0.80mm thick) for the complete portion. The exhaust pipe work includes necessary supports, foundation etc. to avoid any load & stress on turbo charger/exhaust piping. The exhaust pipe support structure shall be got approved by engineer in-charge before execution.

1.2.1.12.2

(a) Exhaust system should create minimum back pressure.
(b) Number of bends should be kept minimum and smooth bends should be used to minimize back pressure.
(c) Pipe sleeve of larger dia should be used while passing the pipe through concrete wall & gap should be filled with 'felt lining.
(d) Exhaust piping inside the Acoustic Enclosure should be lagged with asbestos rope along with aluminum sheet cladding to avoid heat input to the room.
(e) Exhaust flexible shall have it's free length when it is installed. For bigger engines, two flexible bellows can be used.
(f) For engines only one bellow is required. However, If exhaust pipe length is more than 7 m, then additional bellow/provision for expansion should be provided.
(g) 'Class B" MS pipes and long bend/elbows should be used.
(h) The exhaust outlet should be in the direction of prevailing winds and should not allow exhaust gases to enter air inlet/windows etc.
(i) When tail end is horizontal, 45 Degree downward cut should be given at the pipe to avoid rain water entry into exhaust piping.
(j) When tail end is vertical, there should be rain trap to avoid rain water entry. If rain cap is used, the distance between exhaust pipe and rain cap should be higher than diameter of pipe. Horizontal run of exhaust piping should slope downwards away from engine to the condensate trap. Silencer should be installed with drain plug at bottom.

1**.2.1.12.3** ***Optimum Silencer Location:*** **Location** of the silencer in exhaust system has very definite influence on both reduction of noise and back pressure imposed on the system. The preferred silencer locations are given in the Table below, where L is length of the total exhaust system measured from exhaust manifold in meters. Please note that locating the silencer as per optimum silencer location is not mandatory. For high rise buildings, suitable arrangements may have to be provided in consultation with acoustic engineer.

Optimum Location of Silencer (In meters)

In-line Engine	'V' Engine
Best	2L/5 (4L – 1.5)/5
Second best	4L/5 (2L – 4.5)/5
Worst Location of	L/5 of 3L/5 or at tail (3L – 10)/ 5 or at Silencer end of Exhaust the tail end of piping exhaust piping

1.2.1.12.4 *Exhaust stack height:* In order to dispose exhaust above building height, minimum exhaust stack height should be as follows:-

For DG set
H = h+0.2x-_/KVA
Where H = height of exhaust stack
h = height of building

1.2.1.12.5 Care should be taken to ensure that no carbon particle emitted due to exhaust leakage enters and deposits on alternator windings and on open connections.

1.2.1.12.6 *Support to Exhaust Piping*

Exhaust piping should be supported in such manner that load of exhaust piping is not exerted to turbocharger.

1.2.1.13 *Air System*

It is preferable to provide vacuum indicator with all engines to indicate chocked filter. Maximum air intake restrictions with clean and chocked filters should be within prescribed limit as per OEM/manufacturer recommendation for the particular model of the engine. Gensets should be supplied with medium duty/heavy duty air cleaners (specify one only). (Heavy duty air cleaner should be used for installation in dusty or polluted surroundings.)

1.2.1.**14** *Cooling System*

1.2.1.14.1 System should be designed for ambient temperature of 50 Deg. C.
1.2.1.14.2 Water softening/dematerializing plants should be used, if raw water quality is not acceptable.
1.2.1.14.3 Coolant should be used mixed with additive (in suitable proportion) as per recommendation of OEM/Manufacturer for various engine models.
1.2.1.14.4 Radiator fan flow should be free from any obstruction.

1.2.1.14.5 For radiator cooled DG Set and proper room ventilation should be planned at the time of construction of DG room.

1.2.1.14.6 Remote radiator can be used in case of basement installation where fresh air may not be available. The proper location of remote radiator is very essential for the successful and efficient operation of remote radiator. In this the cooling media is ambient air. So in order to obtain maximum efficiency from remote radiator, it is necessary to get fresh air in its surrounding. The horizontal distance of remote radiator from engine should not exceed 10 meter.

1.3 ALTERNATOR

Scope: This section covers technical requirement of the alternator

1.3.1 **Synchronous Alternator:** Self excited, screen protected, self regulated, brush less alternator, Horizontal foot mounted in Single/Double bearing construction(specify one only) suitable for the following:

KVA Rated : 250 KVA
Rated PF. : 0.8 (lag)
Rated voltage : 415 volts
Rated frequency : 50 Hz
No. of phases : 3
Enclosure : SPDP
Degree of protection : IP-23
Ventilation : Self ventilated air cooled
Ambient Temperature : 50º C Maximum
Insulation Class : H
Temperature Rise : Within class H limits at rated load
Voltage Regulation : +/- 1%
Voltage variation : +/- 5%
Overload duration/capacity: 10% for one hour in every 12 hours of Continuous use.
Frequency variation : As defined by the Engine Governor (+/- 1%)
Excitation : Self /separately excited (Self excitation
Type of AVR : Electronic
Type of Bearing and lubrication : Anti-friction bearings with Grease Lubrication arrangement

Standard : IS-4722 & IEC:34 as amended upto date.

1.3.2 Alternator should be able to deliver output rating at 50° C. ambient at 1000 Meter altitude at MSL & at 50% RH.

1.3.3 The alternator shall be fitted with suitable nos. Resistance Temperature Device (BTD) alongwith space heaters. The terminal of space heaters will be wired to terminal box and the temperature scanner shall be provided in control panel for scaling the winding and bearing temperature.

1.3.4 ***Excitation:*** The alternator shall be brushless type and shall be self/separately excited, self

regulated having static excitation facility. The exciter unit should be mounted on the control panel or on the alternator assembly. The rectifier shall be suitable for operation at high ambient temperature at site.

1.3.5 ***Automatic Voltage Regulators (AVR):*** In order to maintain output terminal voltage constant within the regulation limits i.e. +/-1%, Automatic voltage regulator unit shall be provided as per standard practice of manufacturer.

1.3.6 ***Fault tripping:*** In the event of any fault e.g. over voltage/high bearing temperature/ high winding temperature or an external fault, the AVR shall remove the excitation voltage to the alternator. An emergency trip shall also be provided.

1.3.7 ***Standards:*** *The alternator shall be in accordance with the following standards as are applicable.*

(i) IS:4722/BS : 2613/1970. The performance of rotating electrical machine.

(ii) IS:4889/BS:269 rules for method of declaring efficiency of electrical machine.

1.3.8 ***Performance:*** Voltage dip shall not exceed 20% of the rated voltage for any step load of transient load as per ISO:8528 (Part I). The winding shall not develop hot spots exceeding safe limits due to imbalance of 20% between any two phases from no load to full load.

The generator shall preferably be capable of withstanding a current equal to 1.5 times the rated current for a period of not more than 15 seconds as required vide clause 14.1.1 of IS 4722:1992.

The performance characteristics of the alternator shall be as below:

(a) Efficiency at full load 0.8 P.F. not less than 93.5%

(b) Total distortion factor - Less than 3%

(c) (i) 10% overload - One hour in every 12 hrs - of continuous use.
(ii) 50% overload 15 seconds

1.3.9 *Terminal Boxes:* Terminal boxes shall be suitable for U.G. cables The terminal box shall be suitable to withstand the mechanical and thermal stresses developed due to any short circuit at the terminals.

1.3.10 *Earth Terminals:* 2 Nos. earth terminals on opposite side with vibration proof connections, non-ferrous hardware etc. with galvanized plate and passivated washer of minimum size 12mm dia. hole shall be provided.

1.4 CONTROL PANEL, BATTERIES AND ELECTRICAL SYSTEM

Scope: This section covers technical and functional requirements of Control Panel, Battery/Electrical System.

1.4.1 Location of Control Panel:
1.4.1.1 *DG Set with acoustic enclosure*
Associated Control panel of the DG Set should be located inside the acoustic enclosure as per manufacturer's standard.

1.4.2 *Requirement in Control Panel*

The control panel shall e fabricated out of 1.6 mm sheet steel, totally enclosed, dust, damp and vermin proof wall mounted/free standing floor mounted type with IP-53 degree of protection & front operated.

The Standard control panel shall consist the following instruments:

(a) Composite meter for digital display of:

(i) Voltage
(ii) Current
(iii) Power factor
(iv) Frequency
(v) Energy Meter

(b) HRC fuses of suitable rating.
(c) One MCB of suitable rating for DG sets or Switch Disconnector Fuse Unit (SDFU) for higher ratings.
(d) Push button-switch or ON/OFF Switch for ON and OFF operation.
(e) Pilot lamps 3 numbers in case of three phase DG sets.
(f) Battery charger complete with voltage regulator, Voltmeter and Ammeter for charging the battery from external Mains. This will be in addition to the battery charging alternator or dynamo fitted on the engine.

(g) *Instrument fuses*
All the components in the control panel shall be properly mounted, duly wired and labeled. Suitable terminals are to be provided for panel incoming and outgoing connections.

1.4.2.1.1 ***General Features:*** The control panel shall be fabricated out of 1.6 mm sheet steel, totally enclosed, dust, damp and vermin proof free standing floor mounted type & front operated. It shall be made into sections such that as far as feasible, there is no mixing of control, power, DC & AC functions in the same section and they are sufficiently segregated except where their bunching is necessary. Hinged doors shall be provided preferably double leaf for access for routine inspection from the rear. There is no objection to have single leaf hinged door in the

front, all indication lamps, instruments meter etc. shall be flushed in the front. The degree of protection required will be IP-42 conforming to IS:2147.

1.4.2.1.2 ***Terminal blocks and wiring:*** Terminal blocks of robust type and generally not less than 15 Amps capacity, 250/500 volts grade for DC upto 100 volts and 660/1100 volts grade for AC and rest of the junction shall be employed in such a manner so that they are freely accessible for maintenance. All control and small wiring from unit to unit inside the panel shall also be done with not less than 2.5 sq. mm copper conductor PVC insulated and 660/1100 volts grade. Suitable colour coding can be adopted. Wiring system shall be neatly formed and run preferably, function wise and as far as feasible segregated voltage-wise. All ends shall be identified with ferrules at the ends.

1.4.2.1.3 ***Labeling:*** All internal components shall be provided with suitable identification labels suitably engraved. Labels shall be fixed on
buttons, indication lamps etc.

1.4.2.1.4 ***Painting:*** The entire panel shall be given primer coat after proper treatment and powder coating with 7 tanks process before assembly of various items.

1.4.2.1.5 ***Equipment requirements:*** The control cubical shall incorporate into assembly general equipment and systems as under:

(a) Control system equipments and components such as relays, contactors timers, etc. both for automatic operation on main failure and as well as for manual operation.

(b) Equipment and components necessary for testing generating set's healthiness with test mode and with load on mains.

(c) Necessary instruments and accessories such as voltmeter, power factor meter, KW meter, KWH meter, Ammeter, Frequency meter etc. in one energy analyzer unit with selector switch to obtain the reading of desired parameters.

(d) Necessary indication lamps, fuses, terminal blocks, push buttons, control switches etc., as required.

(e) Necessary engine/generating set shut down devices due to faults/ abnormalities.

(f) Necessary visual audio alarm indication and annunciation facility, as specified.

(g) Necessary battery charger.

(h) Necessary excitation control and voltage regulating equipment.

(i) Necessary over head bus trunking terminations all internal wiring, connections etc., as

required

(j) Breakers as specified in the schedule of work.

1.42.1.6 ***System Operation****:* The above-mentioned facilities provided shallafford the following operational requirements.
1.4.2.1.6.1 *Auto Mode:*
(a) A line voltage monitor shall monitor supply voltage on each phase. When the mains supply voltage fails completely or falls below set value (variable between 80% to 95% of thenormal value) on any phase, the monitor module shall initiate start –up of diesel engine. To avoid initiation due to momentary disturbance, a time delay adjustment between0 to 5 second shall be incorporated in start-up initiation.

(b) A three attempt starting facility shall be provided 7 seconds ON, 6 seconds OFF, 7 seconds ON, 6 seconds OFF, 7 seconds ON. If at the end of the third attempt, the engine does not start, it shall be locked out of start and a master timer shall be provided for this function. Suitable adjustment timers are to be incorporated which will make it feasible to vary independently ON-OFF setting periods from 1-10 seconds. If alternator does not build up voltage after the first or second start as may be, further starting attempt will not be made until the starting facility is reset.

(c) Once the alternator has built up voltage, the alternator circuit breaker shall close connecting the load to the alternator. The load is now supplied by the alternator.

(d) When the main supply is restored and is healthy as sensed by the line voltage monitor setting, both for under voltage and unbalance, the system shall be monitored by a suitable timer which can be set between 1 minute to 10 minutes for the load to be transferred automatically to main supply.

(e) The diesel alternator set reverts to standby for next operation as per (a), (b) and (c) above.

1.4.2.1.6.2 ***Manual mode:***

(a) In a manual mode, it shall be feasible to start-up the generator set by the operator on pressing the start push button.
(b) Three attempts starting facility shall be operative for the start-up function.

(c) Alternator circuit breakers closing and trip operations shall also be through operator only by pressing the appropriate button on the panel and closure shall be feasible only after alternator has built up full voltage. If the load is already on ‘mains’, pressure on ‘close’ button shall be ineffective.

(d) Engine shut down, otherwise due to faults, shall be manual by pressing a stop' button.

1.4.2.1.6.3 Test mode:

(a) When under 'test' mode, pressing of 'test' button shall complete the start up sequence simulation and start the engine. The simulation will be that of mains failure. Sequence I (a) and (b) shall be completed.

(b) Engine shall build up voltage but the set shall not take load by closing of alternator circuit breaker. When the load is on the mains, monitoring of performance for voltage/frequency etc. shall be feasible without supply to load.

(c) If during test mode, the power supply has failed, the load shall automatically get transferred to alternator.

(d) Bringing the mode selector to auto position shall shut down the set as per sequence I (d) provided main supply is ON. If the mains supply is not available at that time, the alternator shall take load as in (c) above.

1.4.2.1.7 ***Engine shut down and alternator protection equipments:*** Following shut down and protection system shall be integrated in the control panel.

(a) Engine:

(i) Low lubricating oil pressure shut down. This shall be inoperative during start up and acceleration period.

(ii) High coolant (water temperature shut down.

(iii) Engine over speed shut down.

(b) Alternator Protection: Following protection arrangement shall be made:

(i) Over load
(ii) Short circuit
(iii) Earth fault
(iv) Over voltage

1.4.2.1.8 *Monitoring and metering facilities:*

(a) Necessary energy analyzer unit for visual monitoring of mains, alternator and load voltage, current, frequency, KWH, power factor, etc.

(b) A set of visual monitoring lamp indication for:

i. Load on set
ii. Load on mains
iii. Set on test (Alternator on operation duty, Alternator on standby duty).
iv. Set of lamp for engine shut down for over speed, low lub. Oil pressure and high coolant water temperature, overload trip of alternator, earth fault trip of alternator, engine lock out and failure to start etc. All these indications shall have an audio and visual alarm. When operator accepts the alarm, the hooter will be silenced and the fault indication will become steady until reset by operating a reset button.

1.4.2.1.9 ***Operating devices:*** A set of operation devices shall be incorporated in the front of panel as under:

(a) Master Engine Control Switch: This shall cut off in 'OFF' position DC control to the entire panel, thus preventing start-up of engine due to any cause. However, battery charger and lamp test button for testing the healthiness of indication lamps, DC volt mater/ammeter etc. shall be operative. It shall be feasible to lock the switch in OFF position for maintenance and shut down purposes.

(b) Operation selector switch OFF/AUTO/MANUAL/TEST position.

(c) Energy analyzer unit for display of various electrical parameters like voltage, current, frequency, KW, power factor, etc.

(d) A set of push button, as specified.

(e) Relays, contactor, timers, circuit breakers, as required.

(f) Necessary battery charger with boost/trickle selector, DC voltmeter and DC ammeter.

1.4.2.1.10 ***Compatibility with 'Building Management System' (BMS):*** PLC compatibility and required nos. of Input/Output terminals points should be provided in the AMF control panel.

1.4.3 **Battery/Electrical System**

1.4.3.2.1 Batteries should be placed on stands and relatively at cool place.

1.4.3.2 Battery capacity and copper cable sizes for various engine capacity should be as indicated in the table below. Cable sizes shown are for maximum length of 2m. If length is more,

cable size should be selected in such a way that voltage drop does not exceed 2V.

DG Set Capacity	Battery Capacity (AH)	Cable Size (Material: Copper) Sq.mm	Electrical System (Volts)
250 KVA	As per OEM	As per OEM	24

1.4.3.4 1.5 Sq.mm copper wire should be used for wiring between junction box and Control Panel.

1.4.4 Cabling

1.4.4.1 Power cabling and Control cable between alternator and control panel and control panel and change over switch to mains should be done with recommended cable sizes.
1.4.4.2 Typical cable sizes for 415 V application are provided in Appendix-VI of GSFEW-Part VII (DG Sets 2006).

1.4.4.3 Overheating due to loose thimbling/undersize cables causes most of electrical failures and hence correct size of cable and thimbles should always be used, if cable is specified.

1.4.4.4 While terminating cables, avoid any tension on the bolts/busbars. (if cable is specified

While terminating R, Y & B phase notations should be maintained in the alternator and control panel for easy maintenance

1.4.4.5 Crimped cables should be connected to alternator and control panel through cable glands, if cable is specified.

1.4.4.6 Multi-core copper cables should be used for inter connecting the engine controls with the switchgear and other equipments.

1.4.4.7 For AMF application, multicore core 1.5 sq.mm flexible stranded copper cable for control cabling should be used.

1.4.4.8 It is recommended to support output cables on separate structure on ground so that weights of cables should not fall on alternator/base rail.

1.4.4.9 External wiring, when provided for remote voltage/excitation monitoring/droop CT etc. shall be screened sheathed type. Maximum length of such wiring shall not exceed 5 meters.

1.4.4.10 Alternator Termination Links

1.4.4.10.1 For proper terminations between links and switchgear terminals, the contact area must be adequate. The following situations should
also be avoided as they lead to creation of heat sources at the point of termination:

(i) Point contact arising out of improper position of links with switchgear terminals.
(ii) Gaps between busbars/links and terminals being remedied by connecting bolt/stud. In such cases the bolt will carry the load current. Normally these bolts/studs are made of MS and hence are not designed to carry currents.

1.4.4.10.2 Adequate clearance between busbars/links at terminals should be maintained (IS:4232 may be referred to for guidelines).

1.4.4.10.3 Improper termination will lead to local heat generation which may lead to failure.

1.5 **Warranty- 2 years Comprehensive or 5000 hrs whichever is earlier.**

1.5.2 FOUNDATION

Scope: This section covers details of foundations for DG set with acoustic enclosures.

1.5.3Genset with acoustic enclosure: A PCC foundation (1:2:4-M-20 grade) of approximate depth of 400 mm is required so as to provide leveled surface for placement of the acoustic enclosure. About 250 mm foundation height should be above ground level. The length and breadth of foundation should be at least 250 mm more than the size of the enclosure. Genset should be mounted on AVM's inside the enclosure.

1.6 ACOUSTIC ENCLOSURE

Scope: This section covers technical requirements of the acoustic enclosures.

1.6.1 As per CPCB norms, restriction has been imposed for new DG set for noise level. Therefore, in terms of these norms, acoustic enclosure should be type tested at the climatic conditions specified in pars 1.1.3 through one of the authorized laboratory.

1.6.2 Installation

1.6.2.1 Acoustic enclosures are supplied with built in Anti Vibration Mounting(AVMs). As such Genset can be installed directly on the leveled surface.

1.6.2.2 Exhaust piping outlet should not be turned towards window/ventilator of home or occupied building. Provision of rain cap should be ensured.

1.6.2.3 The acoustic enclosure placement should be such that there is no restriction in front of air inlet and outlet from canopy.

1.6.3 **Service Accessibility**

1.6.3.1 Genset/Engine control panel should be visible from outside the enclosure.

1.6.3.2 Routine/periodical check on engine/alternator (filter replacement and tappet setting etc.) should be possible without dismantling acoustic enclosure.

1.6.3.3 For major repairs/overhaul, it may be required to dismantle the acoustic enclosure.

1.6.3.4 Sufficient space should be available around the Genset for inspection and service.

1.6.4 **General Design Guidelines**

1.6.4.1 To avoid re-circulation of hot air, durable sealing between radiator and canopy is must.
1.6.4.2 Ventilation fans are must for the Gensets cooled by heat-exchanger/cooling tower system.
1.6.4.3 Exhaust piping inside the enclosure must be lagged (except bellow).

1.6.4.4 Temperature rise inside the enclosure should not be more than 5°C for maximum ambient above 50°C and it should be below 10°C for ambient below 40°C

1.6.4.5 There should be provision for oil, coolant drain and fill. Fuel tank should have provision for cleaning.

1.6.5 **Specifications for Acoustic Enclosure**

1.6.5.1 The acoustic enclosure shall be designed and manufactured confirming to relevant standards suitable for out door installation exposed to weather conditions, and to limit overall noise level to 75 dB (A) at a distance of 1 mtr. From the enclosure as per CPCB norms under free field conditions.

1.6.5.2 The construction should be such that it prevents entry of rain water splashing into the enclosure and allows free & quick flow of rain water to the ground in the event of heavy rain. The detailed construction shall confirm to the details as under:

1.6.5.3 The enclosure shall be fabricated out of the CRCA sheet of thickness not less than 1.6 mm on the outside cover with inside cover having not less than 0.6 mm thick perforated powder coated CRCA sheet.

1.6.5.4 The hinged doors shall be made form not less than 16 SWG (1.6 mm) thick CRCA sheet and will be made air tight with neoprene rubber gasket and heavy duty locks.

1.6.5.5 All sheet metal parts should be processed through 11-tank process.

1.6.5.6 The enclosure should be powder coated.

1.6.5.7 The enclosure should accommodate the daily service fuel tank of the D.G. Set to make the system compact. There should be provision of fuel gauge, which should show the level of the fuel even when the DG Set is not running. The gauge should be calibrated. The fuel tank should be filled from the out side as in automobiles and should be with a lockable cap.

1.6.5.8 The batteries should be accommodated in the enclosure in battery rack.
1.6.5.9 The canopy should be provided with high enclosure temperature safety device.

1.6.5.10 The acoustic lining should be made up of high quality insulation material i.e. glass/mineral wool of minimum 100mm thickness for 250KVA capacity 75Kg/cubic metered to 100Kg/cubic meter for sound absorption as per standard design of manufacture's to reduce the sound absorption as per norms. The insulation material shall be covered with fine glass fiber cloth and would be supported by performed M.S. Sheet duly powder coated.

1.6.5.11 The enclosure shall be provided with suitable size and No. of hinged type doors along the length of the enclosure on each side for easy access inside the acoustic enclosure for inspection, operation and maintenance purpose. Sufficient space will be provided inside the enclosure on all sides of the D.G. set for inspection, easy maintenance and repairs.

1.6.5.12 The canopy should be as compact as possible with goods aesthetic look.

1.6.5.13 The complete enclosure shall be modular construction.

1.6.5.14 The forced ventilation shall be as per manufacturer design using either engine radiator fan or additional blower fan(s). If the acoustic enclosure is to be provided with forced ventilation then suitable size of axial flow fan (with motor and auto-start arrangement) and suitable size axial flow exhaust fan to take the hot air from the enclosure complete with necessary motors and auto start arrangement should be provided. The forced ventilation arrangement should be provided with auto stop arrangement to stop after 5 minutes of the stopping of D.G. sets.

1.6.5.15 The acoustic enclosure should be suitable for cable connection/connection through bus-trunking. Such arrangements on acoustic enclosure should be water proof and dust-proof conforming to IP-65 protection.

DETAIL SPECIFICATION OF AUXILLARY EQUIPMENTS ENABLE

Earthing – 6 sets

a. Each Neutral of DG shall be solidly earthed to 2 different earth pits through copper plate of size 600mm x 600mm x 3mm & Via Neutral Contactor. Control scheme shall be provided to ensure that one neutral only of one generator in the group shall be connected to the earth to avoid problem during synchronizing. Also when generator neutral is connected to earth supply transformer earth should be disconnected and vice-versa.
b. on equipment on the skid shall be bonded to the base frame of the skid and the skid shall be connected to the grid earthing by 2 independent parts with copper strips in accordance with IS : 3043.

c. Similarly day tank, panel, battery rack, Electrical panels shall also be grounded by 2no. GI strips.
d. Terminations at equipment shall have flexibility for movement of equipment.

e. Earth Pit: As per detailed in Schedule of quantities.

f. Earth Electrodes in Earth Pits:
g. Earth Bus and Earth Continuity Conductor as required

h. Artificial Treatment of Soil

If the earth resistance is too high and the multiple electrode Earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

I. Entire earth system shall confirm to the Code of Practice as per IS 3043
j. The resistance of Earthing Grid shall not exceed 1.0 ohm.

k) Each body of the DG / Electrical panels shall be connected to minimum 2 nos of earth pits

DRAWINGS & DOCUMENTATION

With offer:

a) Vendor to submit 2 sets of outline dimensions, panel dimensions etc

b) GA Drawing of DG with static & dynamic Loading
c) Drawing of control panel
d) Material List
e) Confirmation of technical details and parameters as per annexure duly filled, stamped and signed.
f) Technical Catalogues

After receipt of order

a) Outline dimensional drawings with general arrangement.

b) Piping flow sheets and piping layout.

c) Electrical wiring and schematic diagram along with cable schedule and general arrangement drawing for control panel.
d) Foundation drawings with Static and Dynamic Loads.
e) Fuel oil system with instrumentation and control with write-up.

f) Lub. oil system with instrumentation and control with write-up.
g) Jacket water scheme with instrumentation and control with write-up.
h) Governor system and voltage regulator write-up.

i) D.G. Set instrumentation and control system with write-up.

j) Gland plate detail drawings
k) Sectional Views
l) Control Schematics
m) Wiring Diagrams
n) Fuel piping diagram along with storage tank.

o) Cooling system details along with equipment layout &PID.

p) Exhaust piping including Chimney & connection details.

Prior to Commissioning

i) Final copies of (i) to p above

ii) Operational & Maintenance Manual (O& M)

iii) Certified test reports (duly signed by client & consultant)

For Record

All above documents duly amended to incorporate all modifications, settings etc., carried out at Site during the Commissioning, Test Reports of Commissioning Tests. and other notes and important observations.

O & M Manual

The manual shall contain the following (but not limited to) information/data
a. Description of the Equipment's Key Features and Operational Logic
b. Operational Instructions and Safe – Guards c. Details of Maintenance with Time – Schedules
d. Fault Diagnostic and Rectification Chart
e. Parts List with Cat. Nos. for Ordering Spares
f. Contact Details of Agency of nearest Dealer.

g. Set of reduced size Final Drawings with settings.

h. Copy of Type, Factory and Commissioning Test Reports.

I. Copy of Technical Catalogues.

j. Special Notes and Instructions.

TESTING

Factory tests
The CLIENT / CONSULTANT or his authorized representative may visit the works during manufacture of equipment to assess the progress of work as well as to ascertain that only quality raw materials are used for the same. They shall be given all assistance to carry out the inspection. Detailed quality assurance plan shall be furnished to the Client prior to visit.

Detailed test procedures along with the facilities available at Vendor's/ Manufacture's works shall be submitted along with the bid. Client's representative shall be given minimum Two week advance notice for witnessing the final testing. Test certificates including test records and Performance curves etc, shall be furnished by the Vendor.
The report on type test conducted for generator not more than 5 Years old as per IS 4722 shall be submitted before dispatch of DG set.

Alternator

a. Open Circuit characteristic test

b. Short Circuit characteristic test
c. Temperature rise test

DG Set

a. Over load test

b. Vibration measurement test

The Vendor shall submit authenticated test certificate for the type test carried out by manufacturer and if required the CLIENT / CONSULTANT can insist for a type test to be carried out on the Generator in the presence of CLIENT / CONSULTANT.

FINAL CHECK

After installation at site the following checks and tests shall be conducted

DG Set

a) Checking of piping interconnections.
b) Checking electrical interconnections

c) Checking of insulation resistance.

d) Checking of Earthing.

e) Checking of instruments and controls.

f) Checking of alignment.

g) Checking of vibration transmission to building a structure.

h) Checking of expansion joints.

i) Pressure testing of piping.

SITE TESTS
The following tests shall be carried out after installation at the site:

- Load Test - 50 % load 15
minutes -100 % load
15 minute

-110 % load 15 minutes (as required)

- Functional testing of all alarm devices
-Checking of the starting time and time up to taking over the full load.

- Testing of noise level at 1 M and 6 M distances.

- Load rejection test

Diesel for testing Purposes shall be borne by Vendor and will be covered in first oil filling i.e 990 ltrs.

Exhaust System Test

a) Checking of silencer operation

b) Checking of surface temperature of exhaust piping

c) Checking of emission as per PCB norms

Free Maintenance and Defects Liability Period

Following are the works which shall be carried out during the free maintenance period.

- Emergency call back service.
- Inspect, clean, oil and grease where necessary.

- Adjustment of machinery.
- Replacement of any defective part.

COMPLETION CERTIFICATE AND GUARANTEE

After the complete testing the Vendor shall furnish the certificate confirming that the installation has been fully completed and as is in conformity with the technical specification BOQ and all requirements of local Authorities and Statutory Bodies.

Vendor shall guarantee that the equipment shall satisfy the requirements of its intended use and be free from latent defects. Vendor shall repair and replace any equipment, which proves to be defective within 12 months from the date of commissioning and handing over the installation. If any defect is noticed during the guarantee period it shall be rectified / replaced at no extra cost. The guarantee period will again commence from the date of such rectifications / replacement.

2.0 LIST OF APPROVED MANUFATURES

1.	L.T. Switchgear	-	Legrand
		-	Hager
		-	Siemens
		-	Schneider
		-	Crompton Greaves
		-	GE
		-	L&T

		-	C&S
2.	Diesel Engine	-	Volvo
		-	Greaves
		-	Caterpillar
		-	Kirloskar
		-	Cummins
3.	Alternator	-	Kirloskar Green
		-	Leroysomer
		-	Cater Pillar
		-	Stamford
4.	Battery Charger	-	AMCO
		-	Expo-Fyn
		-	Aplab
		-	BCH
		-	Micro Tech
		-	Power system controls
		-	Maxcom
5.	Low maintenance lead acid batteries	.	-
		-	Exide
		-	TATA
		-	AMCO
		-	Standard Farrukawa
		-	AMRON
		-	Cummins
		-	OEM of DG Sets

6.	Relay	-	Crompton Greaves
		-	GEC (Alstom)
		-	EE
		-	ABB
7.	Power and Control cable	-	Polycab
	Confirming to IS standard	-	Finolex
		-	ICC
		-	National
		-	ECKO
		-	Rallison Cables (Rollex)
		-	Cable Corporation of India Limited
		-	Havells
		-	RR
8.	Breaker/ contractor/timer	-	Siemens/C&S/L&T/Schneider/Hager/BCH
9.	Control Panel	-	CPRI Approved manufacturer
10.	Digital Meters	-	HPL/Nippon/conzer/Havells/L&T/AE/Hager
11.	CT	-	AE/Kappa/Havells/L&T/Hager
12.	Push Button	-	BCH/Siemens/concord/Havells/ESSBEE
13.	Indication lamp	-	BCH/Siemns/conzor/Havells/ESSBEE

TECHNICAL SPEC FOR 250 KVA SILENT TYPE DG SET

S.No.	Description of technical parameters	Specifications of item offered by Bidder
1	Engine make and model	

2	Alternator make	
3	Rated R.P.M	
4	BHP Rating	
5.	Physical Dimensions:-	
	(a) Length (mm)	
	(b) Width (mm)	
	(c) Height (mm)	
6.	Weight	
7.	Aspiration method	
8.	Lub oil recommended	
9	Lub oil pressure	
10.	Qty. of lub oil required	
11.	Time required for starting	
12.	Lub oil sump capacity	
13.	No. of exhaust pipe required	
14.	Dia. of exhaust pipe	
15.	Whether meets CPCB Norms	
16.	Fuel oil level indicator	
17.	Engine Lub capacity (Ltrs.)	
18.	Specific fuel oil consumption (gm/BHP/Hr.)	
	(a) 100% Loading (Ltrs/hrs)	
	(b) 75% Loading (Ltrs.hrs)	
	(c) 50% Loading (Ltrs/hrs)	

19	No. of cylinder	
20.	Method of starting	
21.	Efficiency	
22.	Exhaust gas Flow Rate	
23.	Compression Ratio	
24.	Exhaust Temperature	
25.	Engine confirming standard	
26	Fuel Tank Capacity (Ltrs.)	
27.	Fuel Tank sheet thickness	
28.	Fuel piping Yes/No	
29.	PT fuel pipe(Yes/No)	
30.	Injectors (Yes/No)	
31.	Fuel Filters (Yes/No)	
32.	Engine mounted oil pump (Yes/No)	
33.	Type of oil cooler	
34.	Type of oil filter	
35.	By Pass Filter (Yes/No)	
36.	Self contained Piping (Yes/No)	
37.	Turbo generator-Type	
38.	Exhaust silencer (Yes/No)	
39.	Governor Type/class	
40.	Engine mounted instrument panel consists:	
a.	Start/stop key switch	

b.	Lub oil Pressure indication	
c.	Water temperature indication	
d.	RPM indication	
e.	Engine Hour indication	
f.	Battery charging indication	
g.	Lub oil trip indication	
h.	High water temperature indication	
i.	Over speed indication	
j.	Any other	
41.	Engine and alternator Protection/safeties provided:	
a.	Low oil pressure shut down	
b.	High coolant (water) temperature shut down	
c.	Engine over speed shutdown	
d.	Over load protection	
e.	Short circuit protection	
f.	Earth fault protection	
g.	Over voltage protection	
h.	Any other protection	
42.	Cooling system type and accessories:-	
a.	System of cooling	
b.	Type of radiator	
c.	Thermostat	
d.	Corrosion inhibitor	

e.	Capacity in ltr. of radiator	
f.	Any other detail	
43.	Battery charger make and specification:-	
	(a) Battery voltage	
	(b) Ah Capacity	
	(c) No. of Battery	
	(d) Mode (auto/normal)	
	(e) Indicating Lamp	
	(f) Name of indicating meter	
	(g) Name of protections:-	
44.	Tool kit set (Yes/No)	
45.	Acoustic enclosure sheet thickness:	
46.	Name the Norms being followed for acoustic enclosure:-	
47.	Ventilation system for heat and air	
48.	Alternator	
	(a) Make & Model	
	(b) KVA/KW rating	
	© output voltage	
	(d) No. of phases output	
	(e) Frequency	
	(f) Insulation class of rotor and stator	
	(g) Standard Enclosure Details	
	(h) Rotor	

	(i) Wave form distortion	
	(j) Total harmonic distortion factor	
	(k) Excitation system	
	(l) Conformance standard	
	(m) Power factor	
	(n) Voltage regulation	
	(o) Full Load output in Kw at 0.8P.F	
	(p) Designed over load capacity at Max. ambient temperature	
	(q) Efficiency at full load	
49.	AMF Panel	
	(a) Auto/manual synchronizing facility	
	(b) Make	
	(c) Degree of Protection	
	(d) Type (Floor/wall mounted)	
	(e) Size	
	(f) Finish	
	(g) Any other detail:-	
	(h) Annunciation window type	
	(i) Name the indications on Annunciation window:-	

50.	Metering	
	(a) Name of the indications (LED)	
	(b) Readings available on confirmed digital meters	
51.	LT switchgear	
	(a) Type of ACB and make	
	(b) Current rating	
	(c) Short circuit capacity	
	(d) Protection facility:-	
	i. Short circuit	
	ii. Over current	
	iii. Earth fault	
52	(a) Sheet thickness of CRCA	
	(b) Current rating of busbars	
	(c) Provision of space heater with thermostat	
	(d) Whether manufacture approved by	

	CPRI	
53.	Make of anti-vibration pads	
54.	Have any service center for both Alternator and engine in the state of J&K?. If Yes mention the address.	
	Name the tests to be carried out at manufacture's site	
a.	Routine test	
b.	Full load test for 1 Hr.	
c.	Over load test @ 110% for 1 Hr.	
d.	Fuel consumption (gm/BHP/Hr.)	
e.	Any other detail	
55.	Name the tests to be carried out at customer's site	
a.	Alignment check	
b.	Insulation test	
c.	Vibration and noise level test	
d.	Testing of safeties	
e.	Earth electrode resistance test	
f.	Any other detail	
56.	**Warrantee of the DG set, Foundation Base, spares and accessories (in months). The warranty will includes the change of Consumables/filters/ Mobil oil as per standard of servicing.**	
57.	**The vendor must have executed in**	

	their own firm name complete SITC of same capacity or two works of 60% capacity or three works for 40% capacity for the last five years.	

Signature of the tenderers with date

Name and address with seal

PRICE-BID (BOQ format is uploaded in MS-Excel)

SCHEDULE OF QUANTITY

Name of the work:-

S.No	Description of work	Quantity		Rate	Unit	Amount
	Sub-Head 'A' (Equipments)					
1	Providing, Installing, Testing & Commissioning of 'Silent Type' Diesel Generating set along with having Prime Power Rating of 250 KVA,415 volts at 1500RPM, 0.8 lagging power factor at 415 V suitable for 50Hz 3 phase system and for 0.85 load factor consisting of followings :-	01 Job complete				
a)	**Diesel Engine :-**					
	Diesel Engine 4 Stroke water cooled, 6 cylinder, inline, electric start of suitable BHP at 1500 RPM suitable for above output of alternator at 47ºC, 50 % RH & at 1600 meter MSL and conforming to BS 5514, BS 649, IS 10000, Capable of taking 10% overloading for 1 hour after 12 hour of continues operation. The engine will be fitted complete with all the required accessories.	01 No.				
b)	**Engine mounted Instrument Panel fitted with and having digital display for following:-**					
-	(i) Star- Stop switch with key					
	(ii) Water temperature indication					
	(iii) Lubrication oil pressure indication					
	(iv) Lubrication oil temperature indication					
	(v) Battery charging indication					
	(vi) RPM indication]					
	(vii) Over speed indication					

	(viii) Low Lub. Oil trip indication					
-	(ix) Engine Hours indication					
c)	**Alternator :-**					
	Synchronous alternator rated at250KVA,415V at 1500RPM,3 phase 50 Hz, AC supply with 0.8 lagging power factor at 50ºC, 50% RH & at 1600 Meter MSL. The alternator shall be having SP DP enclosure, brushless, continuous duty, self exist excited & self- regulated through AVR conforming to IS: 4722/ BS 2613 suitable for tropical condition and with class - F/H insulation.	01 No.				
d)	**Base Frame & Foundation**					
	Both the engine alternator shall be mounted on suitable base frame made of MS channel with necessary reinforcement which shall be installed on suitable cement concrete foundation and vibration isolation arrangement as per recommendation of manufacturer.	01 set				
e)	**Fuel Tank:-**					
	Daily service Fuel tank of 990ltrs. liters capacity with all standard accessories and fuel piping between fuel tank and Diesel engine with MS class 'C' pipes of suitable dia. Complete with valves, level indications & accessories as required as per specifications.	01 No.				
f)	**Exhaust System:-**					
	Dry exhaust mainfold with hospital exhausts silencer and catalytic convertor.	01 set				
g)	**Starting System:-**					
	24V DC starting system comprising of starter motors: Voltage regulation and arrangement for initial excitation complete with suitable nos. of batteries as required as per	01 set				

	specifications or OEM					
h)	Acoustic and weather proof enclosure with arrangement for fresh air intake for cooling if the engine &alternator, extraction, discharging hot air in to the atmosphere as per specifications.	01 set	Sets		Set	
2* **	Fabrication, Installing, Testing, Commissioning of automatic mains failure control including automatic mains failure Panel, suitable for 250 KVA silent type DG set complete with relays, timers, set of CTs for metering & protection and energy analyzer to indicate currents, phase and line voltages, frequency, power factor, KWH, KVARH & provision for overload, short circuit, restricted earth fault, under frequency, control cabling from AMF panel to diesel engine and elsewhere if required, all complete and inter locking including the following :-	01 set				
a)	Auto/Manual/Test/Off selector switch					
b)	2 Nos. over voltage relay, 2 Nos.reverse power relay and Nos. under voltage relay.					
c)	3 Sets of current transformers					
d)	Energy analyzer unit to indicate current voltage frequency power factor and KWH					
e)	Indicating lamps for load on set					
f)	Fuse of instruments					
g)	Battery charger, complete with transformer/ rectifier, D.C. Voltmeter and ammeter, selector switch for trickle, off and boost and current adjustment.					

h)	Main supply failure monitor					
i)	Supply failure timer					
j)	Restoration timer					
k)	Control unit with three impulse automatic engine start/stop and failure to start lockout					
l)	Impulse counter with locking and reset facility					
m)	ON/OFF/Control circuit switch with indicator					
n)	Audio/Video annunciation for					
	(i) High water temperature					
	(ii) Low lubrication oil pressure					
	(iii) Engine over speed					
	(iv) Engine failed to start					
	(v) Full load/maximum load warning					
3	Supplying and fixing exhaust gas piping of suitable dia. Welded black MS, B Class pipe confirming to IS:3589 cut to required lengths and installed with necessary bends, supports and clamps, anti-vibration mountings, insulation of exhaust system with mineral wool/Rockwool, 50mm thick wire mash & cladding etc., as required as per specifications.	01 set				
	Total of Sub Head A					
	Sub-head 'B' Power/ Control Cables					
1.	Supply of PVC/XLPE insulated aluminum conductor armoured cable of 1.1KV grade 3-1/2 core 300sq.mm confirming to latest IS standard	70mtrs.				
2.	Laying and fixing of 1 Nos PVC/ XLPE insulated aluminum conductor power cable 1.1KV grade of size exceeding 120 sqmm but not exceeding to 400sqmm including excavation and protected covering and refilling the trench in the ground	70mtrs.				

	etc. as required					
3	Supplying and laying of Multicore 1.5 sqmm copper cable for Safety connections	70 mtrs				
	Total of Sub Head B					
	Sub-Head 'C' Earthing,					
1	Earthing with Copper** earth plate 600mm X 600mm X 3mm thick** including accessories, providing masonry enclose with cover plate having locking arrangement and watering pipe etc. (with charcoal or coke and salt) compete as required.	05 sets				
2	Providing & Fixing 25mm X 5mm Copper strip** in 40mm size medium class G.I. Pipe from earth electrode in ground, as required.	50 mtrs.				
	Total of Sub Head C					
	Sub Head D Servicing					
3	Servicing of DG set with change of consumables/filters/Mobil oil as per standard during Warrantee period.	02 nos				
	Total of Sub Head D					
	Sub Head E Third Party Inspection					
4	Third Party inspection of DG set from reputed Government agencies like EIL, EPIL, Rites etc.	01 no				
	Total of Sub-head 'E'					
	Sub-head 'F' (civil work)					
1.	Making PCC foundation	01 set				

	completes 1:2:4, M-20 grade of apx. depth of 400mm and 150mm height above ground level the length & breadth of foundation should be at least 350mm more than the size of enclosure of the OEM/OEA.					

Total of Sub Head A+B+C+D+E+F = Rs._____

LIST OF TECHNICAL LITERATURE & CATALOGUE AND ANY OTHER INFORMATION

The Tenderer should furnish the list of Technical Literature & Catalogue of the Equipments offered.

Sr.No.	Data/Information	Remarks
1		
2		
3		
4		