125 KVA DIESEL GENERATOR SET (AS PER CPCB-IV NORMS) WITH ACOUSTIC ENCLOSURE WITH MANUAL PANEL WITH INSTALLATION

Sr. No.	Item description	Quantity	Unit
	Supply, installation, testing and commissioning of 125 KVA, 3 Phase, 415V AC, Silent DG Set comprising of Engine, with minimum 156 BHP, at 1500 RPM, coupled with alternator of same make mounted on a common base frame complete with a) Manual control panel b) Fuel tank c) Battery & leads d) Silencer – Residential e) AVM pads f) First Fill of lube oil g) Acoustic enclosure h) Aluminium Power cable (upto 30 mtr) j) Transportation upto Site k) Commissioning	1	No.

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INTENT OF SPECIFICATION

The specification is intended to cover design, manufacture, assembly, testing at manufacturer's works, supply & delivery, properly packed for transport FOR site of one (1) no. 125 KVA Diesel Generator Set complete with all accessories and Manual Panel, as well as erection testing & commissioning at site, up to satisfactory & trouble-free operation / handing over to the Owner . The equipment shall be fully compliant with the following special requirement:

Noise, Emission & Smoke limits	:	As per latest Amendment of Environment (Protection) Act 1986
Noise level	:	Less than or equal to 75 db (A) at a distance of 1M from of Acoustic Enclosure as per CPCB Norms
Enclosure	:	Acoustic enclosure with Residential Silencer
Service	:	Outdoor
Site Condition	:	The DG Sets and its auxiliaries shall be designed for smooth, efficient and trouble free operation in tropical humid climate having relative humidity of 88% and maximum ambient temperature of 40°C. However, the maximum ambient temperature and the maximum relative humidity are not likely to occur simultaneously.

2.0.0 SCOPE OF WORK

The DG Sets shall be supplied as well as installed for Standby power supply.

2.1.0 SCOPE OF SUPPLY

2.1.1 One (1) no. 125 KVA 415V, 3 phase, 50Hz Diesel Generator set with acoustic complete with Control Panel for protection, metering & operation and all accessories as specified.

2.1.2 Bidder shall submit drawings, documents and manuals, as specified in details elsewhere in this specification. The Dg Set shall be compliance ISO to ISO 50001 Energy Efficient Management. DG Set manufacturer to provide copy of ISO in compliance to the same.

2.2.0 SCOPE OF SERVICES

Scope of services shall include but not limited to the following:

- CPCB Approval certificate (Copy of type approval certificate of offered DG Set model & copy of type approval certificate of offered engine model must be enclosed with the bid).
- PCC Foundation
- 4 Nos. GI Chemical pipe Earthing pits alongwith earthing strip of 5 mtrs per pit
- Aluminium Power Cable of suitable Size of length upto 30 mtrs.
- Commissioning of DG Set

3.0.0 REFERENCE STANDARDS

3.1.0 The design, manufacture and testing of the equipment covered by this standard shall comply with the latest issue of the following codes and other relevant Indian Standard specifications, unless specified otherwise elsewhere in the Technical Specification.

(i) IS 13018 : 1990 – Diesel Engine for General Purpose

(ii) IS – 13364 / IS 4722 – Rotating Electrical Machines

3.1.1 Equipment designed and manufactured to other national standards shall be acceptable provided they are in no way inferior to the above mentioned standards.

3.1.2 The design and operation features of the equipment offered shall also comply with the provisions of

latest issue of the Indian Electricity Rules, Environment (Protection) Act 1986 and other statutory requirements. The supplier shall, wherever necessary, make suitable modification in the equipment to comply with the above.

4.0.0 TECHNICAL REQUIREMENT

4.1.0 DIESEL ENGINE

- Type : The Diesel Engine shall be suitable for generating set application developing specified BHP at 1500 RPM under NTP conditions of BS: 5514 or equivalent in IS, water cooled, turbocharged with after coolers, powered by four (4) strokes, multi cylinder with engine performance requirement as specified below. Diesel engines shall be as per MOEF (MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE) notification dtd. 3rd November 2022. Only Indian origin Engine is acceptable as per PPP (Public Procurements P-45021/2/2017-PP(BE-II)) policy
- Nominal Output : To match with, alternator 125 KVA at 0.8 pf (lagging) i.e., 100 KW.
- Revolution : 1500 rpm
- Starting System : 12 V battery operated electric motor starting.
- Fuel : High speed diesel oil
- Governor : Electronic type
- Aspiration System : Turbocharged, after cooler type
- Cooling System : Water cooled with radiator and fan
- Lubrication System: As per engine OEM Standard

4.1.1 The governing system of the diesel engine shall satisfy the following requirements:

- Steady state speed regulation shall be adjustable between 0 to 5% manually
- Steady state speed regulation once fixed, shall not vary beyond +5%.
- Transient speed regulation shall not exceed 5% of rated speed.
- Recovery time shall be within 30 seconds.

4.1.2 For fuel oil of the engine, one (1) day tank of minimum 230 ltrs alongwith fuel oil filter, levelindicator and float switch shall be provided. The fuel system of the engine shall be complete with suction line, fuel filters, fuel pump, governor, manifold, injectors etc. as required.

4.1.3 The engine shall be supplied complete with coupling, guard, as well as outlet exhaust pipe with silencer.

4.1.4 Suitably rated lead acid sealed maintenance free batteries (for each set) capable for ten consecutive starts, along with charger (with float and boost charging provision) shall be included. Control/monitoring /annunciation requirement

4.1.5 Engine shall meet the following parameters :

- The Engine shall be enclosed in an enclosure to make it work silently (as per CPCB IV norms) without any degradation in its performance.
- The fuel shall be used High Speed Diesel (HSD) as per IS: 1460.
- Filter shall be dry type air filter with replaceable elements.
- The Engine shall have closed loop lubricating system. No moving parts shall require lubrication by hand prior to the start of engine or while it is in operation.
- The Engine shall be electric starting (by 12 V DC starter motor system for 125 KVA DG Set).
- The engine shall be fitted with Electronic Governor.

4.1.6 Instrument Control Panel shall be furnished for the engine, which shall comprise the following:

- Push Button
- Water temp. gauge
- Hour meter with rpm indicator
- Lube oil pressure gauge
- Other item as considered necessary by manufacturer

The Instrument Control Panel shall preferably be mounted on the Diesel Generator skid. Otherwise it may be of separately pedestal / floor mounted type.

4.2.0 GENERATOR / ALTERNATOR:

Alternator with rated output of 125 KVA at STP suitable for continuous operation at 1500 RPM developing 415 volts at 0.8 p. f. (lag) suitable for 50 Hz, three phase, 4 wire system. The alternator shall be brushless type, drip proof, screen protected as per IP-23, self excited & self regulated. The alternator will be suitable for tropical climate and shall conform to IS:4722. The salient features of the alternator are:

- +/- 1% voltage regulation in static conditions.
- IP 23 protection with class 'H' insulation
- Permissible overload of 10% for one hour in 12 hours of operation

S. NO.	PARTICULARS		Value
1	Type	:	Self excited
2	KVA	:	125 KVA
3	Voltage	:	415V, solidly grounded
4	Phase	:	3 phase
5	Frequency	:	50 Hz
6	Power Factor	:	0.8 (lagging)
7	Excitation System	:	Brushless exciter
8	Insulation Class	:	Class "H" insulation with temperature limitations for Class-H
9	Cooling	:	Self cooled
10	Connection	:	Star, with neutral terminal wired up to external bushing
11	Voltage Regulator	:	Solid State Electronic type

4.2.1 The generator set shall be able to withstand a three phase short circuit at its terminal for three (3) seconds without any injury to the machines. This shall be suitable for transient load changes and high motor starting current.

4.2.2 Copy of type test report of Alternator must be enclosed with the bid.

4.2.3 The alternator should be same brand as engine to avail single window service.

4.3.0 MANUAL CONTROL PANEL

4.3.1 The Control Panels shall be free standing, floor mounted, metal clad cubicle type in construction, to form a compact assembly in dust / damp and vermin proof type, equivalent to IP-53. The thickness of sheet steel members shall not be less than 1.6 mm for cold rolled steel. Suitable reinforcement shall be provided, wherever necessary. Copy of IP certificate of Panel must be enclosed with the bid.

4.3.2 The Manual Control Panel for the DG Sets shall house the following devices for control, protection and metering of the set, but not limited to meet the start-stop and operational requirements:

(i) Required Switches and Controls, with push buttons, indication lamps etc. as required, for the set.

4.3.3 The manufacturer shall provide all the protective devices required for the safe operation of the Diesel Generator set. This shall include the following protections as a minimum, and of approved type /make:

- Over current relay
- Over / under voltage relay
- Over / under frequency relay

Alternatively suitable controller shall be provided, incorporating all the above protection features.

4.3.4 Controller provided in DG Set / Control Panel shall have below features :

- Lube oil pressure low
- Cooling water temperature high
- Engine tripped due to over-speed
- Generator tripped due to electrical faults
- Low oil level in fuel oil service tank
- Engine failure to start
- Other items as felt necessary by the manufacturer

Metering and protection as per controller manufacturer standard is also acceptable but subjected that controller shall be of engine manufacturer only.

4.3.5 Metering

- 3 phase current
- 3 phase voltage
- 3 phase Kilo-watt
- 3 phase KVA
- Kilo-watt hour
- Power factor
- System frequency

4.3.6 Starting Battery

Starting battery shall be furnished along with the set, as per following particulars:

i)	Type	:	Lead acid
ii)	Nominal voltage	:	12 V D.C.
iii)	Capacity	:	Minimum 1 Nos. 130 AH battery with each DG Set
iv)	Mounting	:	Inside the Acoustic Enclosure.
v)	Battery	:	The Battery should be same brand as engine to avail single window service.

4.3.7 Battery Charger

i)	Type	:	SMPS based
ii)	Charging System	:	Automatic float and boost charging
iii)	Input voltage	:	230V 1 phase, 50 Hz. Or 415V, 3 phase, 50 Hz.
iv)	Capacity	:	Adequate to restore the fully discharged battery state of full charge in twelve (12) hours.

4.4.0 BASE FRAME

(i) The DG set complete with its accessories shall be mounted on a common base frame.

(ii) In case the manufacturer recommends vibration isolators for the installation of the equipment, the same shall be included in their scope, in required quantities

(iii) AVM Pads as per engine manufacturer standard shall be provided with each DG Set.

4.4.1 Sound Proof Enclosure: This is a special sheet metal fabricated on CNC machine and Powder coated.

The enclosure is designed for reducing the sound level as per approved CPCB norms.
The Acoustic enclosure consists of the following:-

a) **Acoustic Insulation:** Insulated and noise reduction type, properly clamped shall be provided on all doors, roof and sides to absorb noise.
b) **Door Locks and Door Hinges:** Special designed Stainless steel Door Locks and doors hinges ensuring for smooth operation and long life.
c) **Residential Silencer:** Absorption type non-resistance Residential Silencer insulated from inside with glass wool shall be provided to suppress exhaust noise from the engine.

5.0.0 PERFORMANCE REQUIREMENT

Sl. No.	Particulars		Performance Requirement
1	Nominal output of the set	:	125 KVA
2	Rated speed	:	1500 rpm
3	Rated voltage	:	415 volts
4	No of phases	:	3
5	Power factor	:	0.8 (Lagging)
6	Rated frequency	:	50 Hz
7	Overload capacity	:	10% for 1 hour
8	Over speed withstand capacity	:	110% of rated speed for 1 min
9	Voltage Regulation	:	Within +/- 1% of rated voltage from no load to Full load
10	Frequency Regulation	:	Within +/- 4% from no load to full load

5.1.0 The DG set OEM shall have facility to test the DG set at 0.8 pf at full load. Bidder shall provide a certificate issued by an independent govt lab to confirm that the OEM has the required facility to test the DG set at 0.8pf at full load.

6.0.0 TESTS AT SITE

DG Set shall be tested during 30 minutes running at site. Diesel and load will be provided by the department.

7.0.0 TO BE SUBMITTED WITH THE BID

- Manufacturer's catalogues,
- Copy of ISO : 9001 : 2015 certificate issued in the name of DG Set OEM,
- Copy of ISO : 14001 : 2015 certificate issued in the name of DG Set OEM,
- Copy of ISO : 27001 : 2013 certificate issued in the name of DG Set OEM,
- Copy of ISO : 19011: 2018 certificate issued in the name of DG Set OEM.

8.0.0 OTHER MANDATORY TECHNICAL REQUIREMENT IN BRIEF

TECHNICAL SPECIFICATION		
Generator Prime Rating at rated rpm (as per ISO-8528)	kVA	125
	kW	100
Frequency	Hz	50
Power factor	lagging	0.8
Voltage	V	415 (3Ø)

Governing Class (As per ISO 8528 Part-V)		G3
Noise Level @ 1 mtr	dBA	as per CPCB Norms
Fuel Consumption @ 100% load	Ltrs/hr	Not more than 27 Ltrs/hr
Fuel Tank Capacity	Ltrs	Minimum 230 ltrs
Weight of genset with canopy	Kg	Not more than 2400 Kg
Electrical Battery starting voltage	Volts-DC	12
ENGINE		
Rated output (Prime Continuous rating as per ISO 8528-1)	kW	Minimum 114 KW
	HP	Minimum 156 BHP
Engine must be as per CPCB-IV Norms		
Cooling System (mandatory)		Liquid Cooled with CRDI Fuel system
No. of Cylinder (Mandatory)	Number	4
Cubic Capacity² (Minimum)	Ltrs	Minimum 4.30 ltrs
Bore x Stroke	mm	105 X 125
Rated Speed	RPM	1500
Fuel System		HSD
Emission reduction**		Through SCR (Selective Catalytic Reduction) system including DEF (Diesel Exhaust Fluid) & DOC (Diesel Oxygen Catalyst) system
Aspiration	TA	Turbo Charged After Cooled
Lube Oil sump capacity (Minimum)	Ltrs	14 ltrs
Coolant Capacity (Minimum)	Ltrs	28 ltrs
DEF Capacity (Minimum)	Ltrs	25 ltrs
ALTERNATOR		
Type		Brushless , Self excited
Insulation Class		Class H
Protection		IP – 23
Type of AVR		Solid state Electronic type
Alternator Efficiency (at 100 % load)0.8 pf	%	Not less than 91 %
Max Voltage Dip at Full Load 0.8 pf Lag	sec	≤ 20%
Max Time to build up rated voltage at rated RPM		< 5 sec provided engine reach the rated speed
PANEL		
Panel Type		Manual Panel with required switches / cutouts, Contactor and SMPS based battery charger
IP protection		IP - 53 / IP – 55 (certificate to be furnished alongwith Bid)
Acoustic Enclosure		Sheet metal fabricated on CNC turret punch press and Powder coated with 7 tank process. The enclosure should be designed for reducing the sound level as per approved CPCB norms

SCR (Selective Catalytic Reduction) system is to be provided with diesel engine which is a technology that uses a urea-based diesel exhaust fluid (DEF) and a catalytic converter to significantly reduce oxides of nitrogen (NOx) emissions. It is an advanced active emissions control technology system that reduces tailpipe emissions of nitrogen oxides (NOx) down to near-zero levels in newer generation diesel engines. DEF (Diesel Exhaust Fluid) is a liquid used to reduce the amount of air pollution created by a diesel engine. Specifically, DEF is an aqueous urea solution made with 32.5% urea and 67.5% deionized water. DEF is consumed in a selective catalytic reduction (SCR) that lowers the concentration of nitrogen oxides (NO x) in the diesel exhaust emissions from a diesel engine . The main job of diesel exhaust fluid is to break down nitrogen oxide (NOx) gases into nitrogen and water. Apart from this DOC (Diesel Oxygen Catalyst) are catalytic converters designed specifically for diesel engines and equipment to reduce Carbon Monoxide (CO), Hydrocarbons (HC) and Particulate Matter (PM) emissions. A diesel oxidation catalyst (DOC) is an after treatment component that is designed to convert carbon monoxide (CO) and hydrocarbons into carbon dioxide (CO2) and water. It breaks down pollutants in the exhaust stream from a diesel engine, helping to reduce particulate matter (PM). Both carbon monoxide and hydrocarbons are converted in the DOC to carbon dioxide and water vapour.

8.0.0 PACKING

8.1.0 The materials shall be property packed before dispatch to avoid damage during transport, storage and handling.

8.2.0 Proper arrangement shall be provided to handle the equipment.

9.0.0 INSTALLATION, ERECTION, TESTING AND COMMISSIONING

9.1.0 The Contractor shall provide PCC type foundation with the ratio of 4:2:1 shall be provided. The length and breadth of the foundation shall be 300 mm more from the respective length and breadth of the DG set. The height of the foundation shall be 400 mm i.e. 200 mm below and 200 mm above the ground level.

9.2.0 The generator set, control panel, as well as the neutral of the generator shall be effectively earthed. The Contractor shall provide 4 Nos. GI Chemical pipe Earthing Pits (Chemical) with chemical power, chamber cover etc alongwith total 20 mtrs of GI Strip (5 mtr with each Pit) . Out of these 4 earthings, 2 are for DG Set and 2 are for neutral.

9.3.0 Power cabling upto 30 mtrs shall be done by the contractor. Necessary aluminium power cable, cable glands, cable end lugs, PVC numbering ferrules, tapes etc. shall be supplied and installed by the contractor. In case Power cable beyond 30 mtr is required, then the same will be provided by the department.

9.4.0 Residential Silencer and The exhaust pipe upto Silencer shall be provided with each DG Set

9.5.0 The Supplier shall follow occupational health and safety norms, Bidder shall provide copy of ISO 45001 in compliance to the same.

10.0.0 EXCLUSIONS TO BIDDER SCOPE

Following (a to f) are not in scope of Bidder:

a) Any type of statutory approval

b) Diesel & load required for commissioning at site

c) Exhaust pipe beyond Silencer

d) Cable beyond 30 mtr

e) Head loading, Dismantling etc (at site)

f) Any type of Civil or electrical work not given in specifications

11.0.0 OTHER SPECIFIC TERMS

11.1.0 Warranty: 24 months from date of supply or 18 months from the date of commissioning whichever is earlier.

11.2.0 Remote monitoring system to monitor engine is required & the same must be from engine manufacture only.

11.3.0 Shelf life of the DG Set should be 10 years.

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