

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

Sl. No.	Item description	Quantity	Location
	Supply, installation, testing and commissioning of 25 kVA, 3-Phase, 230/ 415 V AC, Silent DG Set comprising of Engine, with minimum 36 BHP, at 1500 RPM, coupled with alternator mounted on a common base frame complete with a) AMF control panel b) Fuel tank c) Battery & leads d) Silencer Residential e) AVM pads f) First Fill of lube oil g) Acoustic enclosure h) Aluminum Power cable as per GeM Standard j) Transportation up to Site k) Commissioning	2 Nos.	1) Bonaigarh, Odisha 2) Motihari, Bihar

1.0.0

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. 25 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.

SCOPE OF SUPPLY

One (1) no. 25 kVA 230V, 3 phase, 50Hz Diesel Generator set with acoustic complete with Control Panel for protection, metering & operation and all accessories as specified. 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.

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
- 3Nos.GI Chemical pipe Earthing pits along with earthing strip of 5 mtrs per pit
- Aluminum Power Cable of suitable Size of length as per GEM standard.
- Commissioning of DG Set

3.0.0

REFERENCE STANDARDS

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) IS13018:1990–Diesel Engine for General Purpose
- (ii) IS–13364/IS4722–Rotating Electrical Machines

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

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

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 after cooled 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, FORE STAND 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 25Kva at 0.8 pf (lagging) i.e., 20KW.
- Revolution : 1500 rpm
- Starting System: 12V battery operated electric motor starting.
- Fuel : High speed diesel oil
- Governor : Electronic type
- Aspiration System: Turbo charged after cooled
- Cooling System: Water cooled with radiator and fan
- Lubrication System: As per engine OEM Standard

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.

For fuel oil of the engine, one (1) day tank of minimum 50 ltrs along with fuel oil filter, level indicator 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. The engine shall be supplied complete with coupling, guard, as well as outlet exhaust pipe with silencer.

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

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 replace able 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 VDC starter motor system for 25 kVA DG Set).
- The engine shall be fitted with Electronic Governor.

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.

GENERATOR/ ALTERNATOR:

Alternator with rated output of 25 kVA at STP suitable for continuous operation at 1500 RPM developing 230 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 over load of 10% for one hour in 12 hours of operation

S. NO.	PARTICULARS	Value
1	Type	: Self excited
2	KVA	: 25 kVA
3	Voltage	: 230V, solidly grounded
4	Phase	: 3phase
5	Frequency	: 50 Hz
6	Power Factor	: 0.8 (lagging)
7	Excitation System	: Brush less 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

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.

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

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

MANUAL CONTROL PANEL

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 or above. 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.

- The AMF 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:
Contactors, with push buttons, indication lamp set as required, for the set. 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.

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.

Metering

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

Starting Battery

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

- | | | | |
|------|-----------------|---|--|
| i) | Type | : | Lead acid |
| ii) | Nominal voltage | : | 12V D.C. |
| iii) | Capacity | : | Minimum 1Nos. 65 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. |

Battery Charger

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

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.
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	: 25 kVA
2	Rated speed	: 1500 rpm
3	Rated voltage	: 230 volts
4	No of phases	: 3
5	Power factor	: 0.8(Lagging)
6	Rated frequency	: 50Hz
7	Over load capacity	: 10 % for 1 hour
8	Over speed with stand capacity	: 110% of rated speedfor1min
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 10-15 minutes running at site. Diesel and load will be provided by the department.

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.
- Type Approval Certificate for Engine model, Alternator and Cop Certificate of Dg Production.

7.0.0

OTHER MANDATORY TECHNICAL REQUIREMENT IN BRIEF

TECHNICAL SPECIFICATION		
Generator Prime Rating at rated rpm (as per ISO-8528)	kVA	25
	kW	20
Frequency	Hz	50
Power factor	Lagging	0.8
Voltage	V	230/ 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 8Ltrs/hr
Fuel Tank Capacity	Ltrs	Minimum 50ltrs
Weight of gen set with canopy	Kg	Not more than 800Kg
Electrical Battery starting voltage	Volts-DC	12
ENGINE		
Rated output (Prime Continuous rating as per ISO 8528-1)	kW	Minimum 26 KW
	HP	Minimum 36 BHP
Engine must be as per CPCB-IV Norms		
Cooling System (mandatory)		Liquid Cooled
No. of Cylinder (Mandatory)	Number	3
Cubic Capacity ² (Minimum)	Ltrs	Minimum 1.65 ltrs
Bore x Stroke	mm	86X94
Rated Speed	RPM	1500
Fuel System		HSD
Emission reduction		DOC (Diesel Oxidation Catalyst) system
Aspiration	TA	Turbo charged after cooled
Lube Oil sump capacity (Minimum)	Ltrs	5.95 ltrs
Coolant Capacity (Minimum)	Ltrs	5ltrs
DEF Capacity (Minimum)	Ltrs	NA
ALTERNATOR		
Type		Brushless, Self excited
Insulation Class		Class H
Protection		IP – 23
Type of AVR		Solid state Electronic type
Alternator Efficiency (at 100% load) 0.8pf	%	Not less than 88%
Max Voltage Dip at Full Load 0.8pf Lag	sec	≤ 20%
Max Time to build up rated voltage at rated RPM		<2 sec provided engine reach the rated speed
PANEL		
Panel Type		MANUAL Panel with required switches/ Cut outs, Contactor and SMPS based battery charger
IP protection		IP -53 /IP – 55 (certificate to be furnished along with Bid) or above
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

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 generator set, control panel, as well as the neutral of the generator shall be effectively earthed. The Contractor shall provide 3 Nos. GI Chemical pipe Earthing Pits (Chemical) with chemical power, chamber cover etc along with total 20 mtrs of GI Strip (5 mtr with each Pit) . Out of these 4 earthings, 2 are for DG Set and 1 are for neutral.
- 9.2.0 Power cabling as per GeM Standard shall be done by the contractor. Necessary aluminum 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 35 mtr is required, then the same will be provided by the department.
- 9.4.0 Residential Silencer and The exhaust pipe up to 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 OTHER SPECIFIC TERMS

- 11.1.0 Warranty: 24months 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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