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OFFICE OF THE SR. GENERAL MANAGER,
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JANAPATH, BHUBANESWAR – 751022.

TECHNICAL SPECIFICATION

250 KVA GENERATOR

SPECIFICATION OF 250 KVA DIESEL GENERATOR

SILENT TYPE WITH AMF ARRANGEMENT

1X 250KVA, 380 BHP, 200KW, SILENT AMF Diesel Generator set, 1500 RPM, Water cooled, 6-Cylinders, Diesel engine with AMF control panel, 250 KVA latest REPUTED AND BRANDED make Engine , Alternator and AMF Panel as required. (Optional accessories and specification also be enclosed)

Diesel engine Specifications and accessories:-

AVM with Acoustic enclosure type, Capacity-380 BHP, 6-Cylinders engine cooling system:

Water/coolant cooling, Radiator type

24V, self starting system with 2-Lead Acid batteries with automatic charging systems etc.

Diesel tank-As per manufacturer recommendation but for 350 ltr capacity minimum.

Safety Controls:

1. Low Lube oil pressure
2. High water temperature
3. Battery Charging indicator
4. Oil temperature indicators
5. Warning signals with hooters
6. Rpm indicator

Alternator

1X 250KVA capacity, 415v AC, 3phase,50Hz, 1500rpm

- a) Numerical type AVR etc.
- b) Control panel accessories for both DG sets
- c) Frequency meter
- d) Pilot lamps
- e) Current transformers
- f) Instrument fuses

- g) Suitable rating ACB (2 Incomers + 1 bus coupler 800A, 4 Pole 50KA rating L&T/ Siemens make ACB)
- h) Control cables and other accessories as per manufacturer
- i) Electronic KWH meter of 0.2 class acc
- J) ELCB etc.

Engine shall conform to BS. 649 or IS 10002: 1981, Alternator BS 2613: 1970 or IS 4722: 1968 etc **or its latest.**

Cables (a) Control cable as required

- (b) Power cables-3.5 CoreX300 Sqmm three run for each Generator for a length of 200 mtr (Total 1200 mtrs) of **PVC armored Aluminium cable.**

1. DIESEL ENGINE:

An engine of reputed make, suitable for 1X 250KVA GENSET, inline type, turbo charged, water cooled, electric starting, 1500RPM, four stroke, Multicyclinder diesel engine confirming to BS: 5514/ BS: 649/IS:10000, with 10% overloading for 01 hour in any 12hours of continuous operation in standard operating conditions in our country. The engine should be able to take 100% load with deration up to 50°C ambient temperature and up to 250m altitude.

2. COOLING SYSTEM:

- Heavy-duty radiator with fan
- Cooling water centrifugal pump
- Coolant Inhibitor

3. EXHAUST SYSTEM:

- Exhaust Gas Turbo Charger
- Exhaust manifolds
- Suitably designed critical grade Nelson silencer complete with thermal insulation and Aluminium cladding.
- Suitably designed exhaust pipe with flexible for carrying the exhaust gases out with minimize back pressure on engine.
- Suitably designed stack of height 05mtrs above the roof of Multistoreyed building (total 35m above ground level) so that the back pressure on engine is minimum. The exhaust stack may be supported with the building wall through clamps, rubber pads, so that vibration is not transmitted to the building.

- Suitably designed pipe for connecting silencer with stack, so that the back pressure on engine is minimum.
- The engine back pressure should not be more than 2.5inches of mercury at exhaust point.
- Port hole shall be provided as per the emission regulation part- III(CPCB publication).

4. FUEL SYSTEM:

- P.T. Fuel pump
- Fuel Injectors
- Fuel filters
- Fuel hoses

5. LUBE OIL SYSTEM:

- Lube oil pump
- Lube oil filters
- Super Bypass filters

6. INTAKE AIR SYSTEM:

- Air intake manifold
- Air cleaner with replaceable elements-inner/outer

7. GOVERNER

- Electronic Governor
- Electronic control panel with digital metering

8. STARTING SYSTEM:

- Electric starter – 24volts DC
- Battery Charging alternator

9. COUPLING ARRANGEMENT:

- Flywheel to suit single bearing alternator
- Flywheel housing (SAE housing)
- Inbuilt AM pads to reduce vibrations and eliminate misalignment of engine and alternator

10. SAFTY CONTROLS:

- High water temperaure
- Low lube oil pressure
- Over speed, Over Crank

11. ENGINE INSTRUMENT PANEL (ENGINE MOUNTED):

- Starting switch with OFF/START KEY
- Water temperature display
- Lube oil pressure display
- RPM display
- Tachometer with hour meter

12. MAUALS:

- Engine operation and maintenance manual
- Alternator manual with Parts catalogue
- Engine maintenance schedule
- Warranty card
- Engine routine certificate

13. ALTERNATOR:

- Synchronous brushless, single bearing alternator, rated at 250KVA, suitable for continuous operation at 1500rpm generating 415volts at 0.8 power factor (lag) suitable for 50Hz, 3 phase, 4 wire system. The alternator shall be self excited, self regulated, foot mounted fitted with ball and/or roller bearings. The alternator shall be suitable for tropical climate and shall conform to BS: 2613/ IS: 4722. The class of insulation shall be “H” type.

14. BASE FRAME:

Heavy duty base frame of sturdy design made of M.S. steel with necessary reinforcement and pre-drilled holes, to support the DG set and enclosure.

15. VIBRATION INSULATION:

Specially designed poly bond anti-vibration mounts for vibration insulation should be used between engine/alternator and base frame.

16. FUEL TANK

Base fuel tank of sheet metal (14SWG), having a capacity of min. 350liters, duly fabricated and painted, complete with drain valve, air vent, level indicator, inlet and outlet connection, locking arrangement to avoid theft of oil, and housed in the base frame.

17. BATTERIES:

Two numbers batteries or as required for starting of 12 volts, 180 AH each in dry and uncharged condition of reputed make with ignition charging, connecting leads and terminals, provided inside the enclosure.

18. COUPLING AND MOUNTING ARRANGEMENT:

The engine and alternator shall be directly coupled and mounted through in built AVM pads on a heavy duty steel base frame. There shall be no chance of mis-alignment of the DG set and the vibrations of the DG set shall not get transmitted to the base-frame and to the enclosure.

19. AMF CONTROL PANEL:

The control panel body shall be fabricated out of 16SWG MS sheet. Panel shall be floor mounted indoor installed, dust and vermin proof. Control wiring shall be 2.5sq.mm shall be used. Cables shall be ferruled for proper maintenance/ checking/ wiring of panel. Detachable cable gland plates are to be provided. This shall be of indoor type.

The panel shall be equipped as follows:

Power Circuit:

- One contractor for mains
- One contractor for DG set interlocked with the mains contractor.

Metering:

- One voltmeter with selector switch
- One ammeter with selector switch
- One frequency meter
- Fuel level gauge

Set of push buttons, selector switches and indicating lamps

- Continuous sensing of mains and generator voltage
- Auto start and changeover in case of mains failure
- Auto stop and changeover in case of mains resumption
- Three attempt starting
- Over current relay for protection against overloading of DG set

Audio- Video annunciation with engine shutdown for

- Low lube oil pressure
- High cooling water temperature
- High canopy temperature
- Over current trip

Battery charger consisting of

- Transformer of suitable rating

- Rectifier rate selector switch for “ Trickle” or “ Boost”
- DC ammeter and DC voltmeter
- An indicating lamp for battery being charged

20. The DG set should comply with the noise limit of 75db(A) at 01m from the enclosure surface and other requirements given in and as per the document “ System & Procedure for Compliance with Noise Limits for Diesel Generator Sets(upto 1000KVA)” issued by CPCB.

21. The diesel engine shall comply with the emission limits given in G.S.R. 371, dated 17.5.02 and G.S.R. 520, dt. 01.7.03 (irrespective of the date of implementation given in the notification) and certified as per emission norms of DOI already notified and or any latest emission note declared by the concerned authority.

22. ACOUSTIC ENCLOSURE:

- Acoustic enclosure should be integral part of the Gen set.
- The acoustic enclosure should be modular construction with the provision to assemble and dismantle easily as per site condition.
- There should be no protruding parts.
- The enclosure should be fabricated out of CRCA sheet of 14SWG.
- The sheet metal components should be dip seven tank pretreated.
- To have long life of the enclosure it should be P.P. based powder coated (inside as well outside). All nut and bolt hardware's be Zinc coated or Stainless Steel.
- Fuel tank at the base of the DG set should have minimum capacity of 350litres. It should be provided with breather, drain plug, fuel gauge meters to indicate fuel level and locking arrangement to avoid theft of oil.
- There should be provision for filling the fuel from outside as in the case of automobiles with locking arrangement.
- Battery should be accommodated in a separate tray in the enclosure.
- There should be provision for drain plugs for draining Mobil oil/ diesel from outside the enclosure.
- The doors to be provided with high quality EPDM gaskets to avoid leakage of sound.
- The lockable type door handles should be provided.
- Sound proofing of enclosure to be done with high quality rock wool conforming to IS 8183, of minimum 100mm thickness and density of 48-64 kg/m³.

- The rock wool should further be covered with fiber glass cloth and perforated galvanized MS sheet.
- A special critical grade silencer is required to be provided to control exhaust noise. (minimum 25dBA insertion loss)
- Specially designed anti is required to be provided to meet air requirement for combustion and heat removal. A blower should be used to meet total air requirement, air changes, if required.
- Temperature inside enclosure should not exceed beyond 7° C of ambient temperature.
- A provision for emergency shutdown from outside the container should be made.
- Control panel should carry warranty of respective manufacturer for diesel generating set in enclosure.
- The acoustic enclosure shall be rain/ water proof.

23. FUEL CONSUMPTION:

- Engine should be capable of providing fuel consumption of 4 units/lit of diesel, between 80 to 100% load as per BS 5514.

23. INSTALLATION:

- (i) The base of the Genset shall be minimum 30cm from the ground level so that the oil/fuel can be drained out easily.
- (ii) The ground up to 01m around the Genset shall be made of cement concrete platform of mix 1:2:4(1 cement, 2 Coarse Sand, 4 Stone Chips 20mm).

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SCHEDULE OF WORK AND SUPPLY

250 KVA DG set - 1 No.

SL. NO.	DESCRIPTION	QTY.
1.0	Supply of 250 KVA DG set with acoustic enclosure as per enclosed technical specification.	1 Set
2.0	AMF Control Panel with Numerical relay with Bus coupler Panel	1Ste
3.0	Transportation of unloading and placement of DG set to site.	1 Job
4.0	Preparation of concrete slab with load bearing capacity sufficient to take dead load of DG set	1 Job
5.0	Earthing system 600x 600mm G.I. plate, G.I strip 50mm x 6mm, 50mm dia. G.I. pipe including fittings, Charcoal and salt, Hodi cover	12 nos.
6.0	G.I. Strip: 50mm X6mm	As per site
7.0	Cabling system 3.5 core Al. armoured cable 300 sq. mm	As per site

8.0	End termination of 3.5 Core Al. Armoured cable 300 sqmm with double compression Gland and thimbles	As per site
9.0	Control Cable 2.5sq.mm 12 core	As per site
10.0	Connection with Main/Emergency Distribution Panels along with modifications in the Main/ Emergency Panel at substation of CPCB.	As per site
11.0	Exhaust system: Provision of M.S.pipe of suitable diameter (class B pipe) to height 5mtr above rooftop of DG room (total 5mtr from the ground level). The size of the pipe should be such that there is no back pressure beyond allowable limits. Suitable M.S. flange, nuts & bolts with support brackets & structure, Al. Cladding on thermal insulation to be provided.	As per site As per site
12.0	Fuel system: Min. 350 litre fuel tank at the base of DG set by 19mm M.S. pipe (C Class) with fuel fitting NRV etc. with effective locking arrangement.	
13.0	Sami Rotary Diesel Pump	One
14.0	Clearance from Various department	One Job
15.0	Testing & Commissioning	One Job

Guaranteed Technical Particulars

(To be furnished by the bidders)

(A)	Alternator		
1.	Name of manufacturer	:	
2.	Brand Name	:	
3.	Factory Address	:	
4.	Reference Standard	:	
5.	Frequency	:	
6.	Rated Voltage	:	
7.	No. of phases	:	
8.	Rated speed	:	
a)	No load	:	
b)	Rated load	:	
9.	Phase sequence (Viewed from driving end)	:	
10.	Power factor	:	
11.	Rated output (KW/KVA)	:	
12.	Rated Current	:	
13.	Direction of rotation		

14.	Excitation system		
15.	Duty type		
16	Class of Insulation	:	
17.	Temperature rise	:	
18.	Efficiency at rated voltage and frequency and 0.8 pf	:	
a)	In full load	:	
b)	1/3 load	:	
c)	$\frac{3}{4}$ load	:	
19	Short circuit rating (Peak)	:	
20	Over speed limit	:	
21	Limits of vibration	:	
22	Type of enclosure	:	
23	Cooling system	:	
24	Variation in	:	
a)	Voltage	:	
b)	Frequency	:	
25	Fly wheel effect of rotating parts	:	
26	Cyclic irregularity	:	
27	Irregularity of wave from %	:	
28	Overload withstand capacity	:	
a)	Momentary	:	
b)	Intermittent	:	
C)	Sustained	:	
29.	Motor starting ability (Current / duration)	:	
	<u>PRIME MOVER</u>	:	
1.	Name of the engine manufacturer	:	
2.	Type of engine	:	
3.	Model and number of cylinders	:	
4.	IS rating	:	
a)	Rating A (With overload)	:	
b)	Rating B (Without overload)	:	
5.	Rating at site condition	:	
6.	Direction of rotation	:	
7.	No. & arrangement of cylinders	:	
8.	Whether two stroke or four stroke	:	
9.	Bore (mm)	:	
10.	Stroke(mm)	:	
11.	Cubic capacity(Litres)	:	

12.	Nominal Compression Ration	:	
13.	BMEP Developed	:	
14.	Mean piston speed	:	
15.	Muffler (silencer) type	:	
16.	Filter type and make	:	
a)	Air	:	
b)	Fuel	:	
c)	Lubricating Oil	:	
17.	Recommended fuel oil specification	:	
18.	Fuel oil tank capacity	:	
19.	Lubricating oil specification	:	
20.	Mode of starting, apparatus required	:	
21.	Specific fuel consumption in Litres per hour under standard reference conditions as per IS. 10000 part- II.	:	
a)	At rated output	:	
b)	At 110% of rated load	:	
c)	At 75% of rated load	:	
d)	At 50% of rated load	:	
e)	At 25% of rated load	:	
22.	Lubricating oil consumption at 100% load in litre/ engine operating hour.	:	
23.	Weight of engine	:	
24.	Overall dimension of engine	:	
25.	Performance curves as per IS-10000(part-VI) 1980 at Standard reference condition.	:	
26.	Accessories on engine as tested and for which a power allowance has been made in the manufacturers calculation of the site rating.	:	
27.	Voltage of electrical system	:	
28.	List of equipment and tools that will normally be supplied	:	
29.	List of supplementary equipment	:	
30.	Schedule of recommended maintenance and overhaul periods.	:	
31.	Maximum permissible back pressure in the exhaust system and maximum permissible intake depression.	:	
32.	Method of cooling and capacity of the cooling system with specific rates of water and oil circulation.	:	
33.	The maximum load that can be suddenly applied to the engine while it is running it is at full rated speed, at no load and at normal running temperatures.	:	
34.	The transient and permanent speed changes	:	

	that will result from the application of this load.		
35.	The transient and permanent speed rise resulting from full load being thrown off.	:	
36.	The transient and permanent speed change of load, both off and on, by all steps of 25 percent of the rated full load.	:	
37.	The steady state speed band recovery time to this speed band from all the conditions stated above.	:	
38.	Aspiration	:	
	<u>ACOUSTIC ENCLOSURE</u>	:	
1.	Name of Acoustic Enclosure manufacturer	:	
2.	Enclosure material	:	
3.	Insulation materials	:	
4.	Type of shutters	:	
5.	Overall dimension LXBXH	:	
6.	Noise level to be achieved	:	
7.	Maximum rise in inside temperature above ambient at full load	:	
8	Provision of illumination inside the enclosure	:	
9.	Handling / Lifting facilities	:	

Engine : Cummins / Kirloskar/ Greaves / Caterpillar / Valvo make
 Alternator: Stamford / KEC / Crompton / Valvo make
 L.T Switchgear- L&T / Siemens/ M.G make
 Cable- **as per OPTCL vendor**,
 Relays to be of numerical type