

Annexure-A

Supply, Installation, Testing & Commissioning of DG Set 125 kVA at PIT, Nandgarh

TECHNICAL SPECIFICATION OF 125 KVA D.G. SET

Salient Features of 125KVA Silent DG Set

- Compact, Sleek, Manual/ Automatic.
- Sound proof, Weather proof enclosure.
- Confirms to statutory Govt. noise level norms.
- Custom/ Tailor made design, engineered by a team of experts using modern CAD/CAM techniques.
- The Enclosure is of modular construction with the provision to assemble and dismantle easily.
- The Enclosure is fabricated in 16 SWG-CRCA-sheet.
- The sheet metal components are eight tank pretreated and is Polyester based powder coated (inside as well as outside) for long life.
- All Nuts-bolts, hardware are of Stainless Steel.
- Battery is provided in a tray inside the Enclosure.
- Doors are gasketed with high quality EPDM gaskets to avoid leakage of sound.
- Sound proofing of enclosure is done with high quality rock wool confirming to IS 8183 to suitable thickness and density.
- Rock wool is further covered with fibreglass sheet and perforated powder coated sheet.
- A special Critical grade silencer is provided to control exhaust noise.
- Specially designed sound attenuators are provided to control sound at air entry & exit points inside the Enclosure.
- To make the system vibration free, engine and alternator are mounted on specially designed anti-vibration pads mounted on Base frame.
- The enclosure is designed and layout of the equipment is such that there is easy access to serviceable parts.
- Adequate ventilation is provided to meet air requirement for combustion & heat removal.
- There is an arrangement for illumination inside the Enclosure.
- The silent DG set has the following safeties:



- ♦ High water temperature.
- ♦ Low lub oil pressure.
- ♦ High enclosure temperature.
- ♦ Emergency stop push button outside the Enclosure.
- Control panel is mounted inside Enclosure itself. All parameters are visible from outside & all push buttons accessible through a separate door.
- Engine/ Alternator used for maximum Silent DG set carries a warranty for their respective model.
- Noise level is 75 dB (A) at distance of 1 mtrs. in open free field environment as per ISO 8528 part 10.

THICKNESS OF SHEET - 16-G

High class sheet metal fabricated enclosure for reducing the noise level of DG set & also acts as a weather proof housing. Genset will be a integral part of acoustic enclosure and whole construction will be on multi-fold sheet channels & ISMC sections. Enclosure construction is fully bolted keeping in view the major service requirements all doors are provided with specially designed hinges and lockable handles. Battery, Fuel tank is housed inside the enclosure.

ACOUSTIC MATERIALS

Rock wool in the form of slabs of 100 mm thickness and 96 KG/Metric cube density (Specification of Rock wool conforms to IS 8183).

Further to increase the life of Acoustic material resin coated fibre glass cloth is provided on exposed surface of Rock wool slabs and the panels are supported by perforated sheets.

VENTILATION

Acoustic enclosure is designed in such a way that there are no hot pockets around engine and it is provided with suitable designed engine radiator which does not allow the temperature to rise more than 7°C above ambient temperature.

To achieve optimal output and minimum sound level from the DG set, suitable openings with acoustic hoods are provide for increasing the inflow of air required for combustion & forced ventilation. Air intake system as per the recommendations and engine requirement are provided.

- Acoustic hoods with noise splitters provided to block and reduce the sound leakage.
- The sound control system designed to suppress the sound level to 75 db maximum at 1 metres distance in open free field environment as per ISO 8528 part 10.

SILENCER

Specially designed low noise silencer is provided. Silencer & engine exhaust outlet, Connected with flexible SS below.



VIBRATION ISOLATION

To avoid transfer of vibration from genset to enclosure & surrounding specially designed vibration isolators are used.

DIESEL ENGINE:

6 cylinders, vertical 4 stroke cycle, Water cooled, turbo charged developing 159 **BHP** at 1500 RPM under NTP conditions of BS: 5514. The engine shall be provided with electrical starting arrangement and shall give the electrical output of 125 **KVA/ 200 KW** at 0.8 power factor, 415 Volts at the alternator terminal. Make- Caterpillar, Kirloskar, Cummins

Other accessories of the engine would be as under:

COOLING SYSTEM

- Radiator cooled
- Engine mounted Water pump
- Thermostats
- Corrosion Inhibitor
- Self contained piping

FUEL SYSTEM

- Inline fuel Pump
- Injectors
- Spin on type Fuel filters
- Self contained piping

LUBRICATING SYSTEM

- Oil pump
- Strainer
- Lub oil cooler – Plate type
- Spin on type Oil filter
- Bypass filter
- Self contained piping

AIR INTAKE SYSTEM

- Dry type Heavy Duty replaceable Paper element Air Cleaner with restriction indicator
- Air intake manifold with necessary connections
- Turbo charged air to air cooled

EXHAUST SYSTEM

- Exhaust manifold
- Stainless Steel exhaust flexible coupling
- Silencer (**Critical Grade**)

GOVERNING SYSTEM

- Electronic Governor (Digital)



STARTING SYSTEM

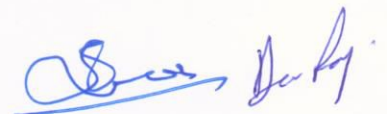
- Starter, 24V, DC
- Battery charging Alternator
- With in-built Regulator

OTHER SYSTEM

- Flywheel
- Flywheel housing
- Control Panel: The control panel is manufactured with 14/16 gauge CRCA sheet and is powder coated for weather-proof and long lasting finish.
- The control panel consists of the following parts:
 - - PC 1.1 Controller
 - - Aluminum bus bars with suitable capacity with in/outgoing terminals
 - - Indicating lamps for 'Load On' and 'Set Running'
 - - Instrument fuses duly wired and ferruled
 - - MCCB of suitable rating with overload and short circuit Protections
- **Genset controller PC 1.1**
 - - Basic stand-alone Genset control system
 - - Feature laden modular Genset control system
 - - Part of our modular and interchangeable control product line
 - PMG compatibility and extra inputs and communication capability (ModBus & CAN), are the major advantages.
 - Features:
 - - Digital Full Wave SCR AVR for shunt or PMG excitation with torque matching.
 - - Digital Electronic Governing with temperature compensation and Smart Starting.
 - - SAE J1939 Interface to Full Authority Electronic (FAE) engines. (For future products considering CPCB-II)
 - - Engine Metering: Oil Pressure, Coolant Temperature, Battery Voltage, Engine Speed
 - - AC Alternator Metering: L-L Voltage and N voltage (phase and average), Current (phase and total), Volt-Amperes (phase and total), and Frequency.
 - - Engine Protection: Low Lube Oil Pressure, High Coolant Temperature, Over speed, DC Over/Under/Weak Volts, Fail to Crank/Start, Sensor Failure.
 - - AC Alternator Protection: Over/Under Voltage, Over/Under Frequency, Over Current, Short Circuit, and Loss of AC Sensing.
 - - Fault Codes and Description on HMI
 - - Data Logging: Engine Hours, Control Hours, Engine Starts and



- 10 Fault Codes
- - Control Set-Up without PC-based tool (In Power)
- - Battle Short fault bypass function
- - Configurable Glow Plug Control
- - Configurable Cycle Cranking
- - 12 and 24 Volt DC Operation
- - Easy Wiring connectors for factory connections, terminal blocks for field connections
- - Configurable Time Delay Start/Stop
- - Sleep Mode Low power in Off and/or Auto
- - Programmable I/O (2 inputs and 2 outputs) expandable with AUX101/102 modules
- - Low Coolant Level and Low Fuel Level Fault Inputs
- - Self-Configuring PCCNet Network
- - Easy Upgrades / Downgrades to PCC1302, PCC2300 and PCC3300
- - Modbus Interface (RS485 RTU)
- - InPower Compatible (PC based service tool)
- - Environmental Protection (NEMA 3R/IP53)
- - NFPA110 Level 1 Compliant (with remote annunciation)
- - UL508 Recognized / CSA Certified / CE Compliant
- Accessories:
- - Silencer suitably optimized to meet stringent sound emission standards laid down by MOEF / CPCB
- - Base rail with integral fuel tank and 360 litres for 125 kVA) is provided with drain plug, air vent, inlet and outlet connection, level indicator, manhole etc.
- - 2 x 12 V dry, uncharged batteries with connecting leads and Terminals
- **Acoustic enclosure:**
- - Specially designed to meet stringent MOEF/ CPCB norms of 75 dBA @ 1mtr at 75% load under free field conditions
- - Designed to have optimum serviceability
- - Air inlet louvers specially designed to operate at rated load even at 50 deg C air inlet temp.
- - Made on special purpose CNC machines for consistency in quality and workmanship
- - Powder coated for long lasting service life and superior finish
- - With UV resistant powder coating, can withstand extreme environment
- - Use of stainless steel hardware
- - Insulation material meets exacting IS 8183 specs for better sound attenuation



ALTERNATOR:

| | | |
|-----------------------------|---|--|
| Manufacturer | : | Stamford, Kirloskar, Crompton |
| Output | : | 125 KVA |
| Power factor | : | 0.8 |
| Rated Generating Voltage | : | 415 Volts |
| Voltage regulation | : | +/- 1% all load between no load to full load & factor 0.8 to unity |
| Frequency | : | 50 Hz |
| Speed | : | 1500 RPM |
| Class of insulation | : | H |
| Winding connection | : | Star connection (all six leads will be brought out of stator frame) |
| Overload capacity exceeding | : | 10% for one hour in any 12 hours of operation without temperature rise limits specified in BS: 2613 or BS: 5000 when corrected to ambient temperature at site. |
| AVR | : | Digital automatic voltage regulator (part of PCC 1301) |
| Bearings | : | Long life single bearing |
| Enclosures | : | Drip proof & screen protected IP-23 |
| Parallel operation | : | All machines shall be suitable for operation in parallel. Damper winding shall be provided to facilitate parallel operation |

The alternator shall be of self-excited, self regulated, self ventilated in brushless design, provided with suitable automatic voltage regulator and shall conform to BS:2613 or BS : 5000 and shall give rated output at NTP conditions.

ESSENTIAL ACCESSORIES:

One set of essential accessories shall be supplied with each D.G. Set. This set of accessories shall comprise of the following:

BASE RAIL:

Base rail with integral fuel tank is provided



FUEL TANK:

One no. sub base fuel tank of **360 LITRES** capacity for each DG set is provided in the base rail.

BATTERIES:

For electrical control circuit of 24 volt DC, 2 Nos. Batteries of 12 volts each (dry and uncharged) of **PULSELITE** make with battery leads for electrical starting of each DG Set.

Two handwritten signatures in blue ink. The signature on the left is stylized and appears to be 'S. S. S.', while the signature on the right is more legible and appears to be 'D. S. S.'.

CONTROL PANEL FOR DG SET:

The Generator control shall be indoor type, floor mounted, dust and vermin proof in sheet steel construction. The panel shall have doors at the front and back for proper maintenance. The panel shall have steel channel fabricated kick-plate and bolted type cable gland plate fitted at the bottom. The panel shall be constructed from 2 mm thick steel sheet. All the joints shall have proper gaskets.

Monitoring and control devices shall be housed on the front door. Generally the construction of the panel will be such that various equipments for applications will be housed in compartments. All incoming and outgoing power and control cables shall be from the bottom.

Panel will be equipped as follows:

INCOMER

- 1 no. 3 pole, **SUITABLE RATING** MCCB
- Set of CTs for metering

INSTRUMENT

- 1 - Voltmeter with selector switch
- 1 - Ammeter with selector switch
- 1 - Frequency meter
- 1 - KWH meter/ KW meter- Digital

INDICATION LAMPS

- Genset Running
- Set on Load
- Phase Indication
- **-WARRANTEE:**
- The offered Cummins Engine & Stamford Alternator is warranted for a period of 2 years from the date of despatch OR 5000 Hrs. of operation from the date of commissioning, whichever is earlier against any manufacturing defect/defective materials only. However, electrical and other proprietary items would be covered as per their respective manufacturer's standard warranty clause.

