Mobile Power Interface & Specs

Control House / MCC / Breaker requires 480 V, 60 Hz , 190 kW of auxiliary power

- Generator output is 13.8 kV @ 60Hz, 11.5 kV @ 50 Hz, switchgear is located on Auxiliary Trailer
- Each Trailer has grounding pads

Gaseous Fuel Supply - 395 psig @ 12,000 pph

- Liquid Fuel Supply - 30 psig @ 40 gpm

Water Injection Supply - 15 psig @ 28 gpm (maximum)

- Inlet Fogging Supply - 15 psig @ 60 gpm (maximum) Inlet

Air - 150,000 CFM

- Exhaust Flow - 490,000 to 550,000 lbs/hr @ 980 deg. F - dry operations
- Trailer Mounted LM2500 may be installed on crushed gravel with steel support plates or 4" concrete foundation with steel support plates. Site grade must be no greater than 6" per 100'.
- Emissions - 42 ppm NOx (liquid fuel with water injection), 25 ppm NOx (gaseous fuel with water injection)
- Noise - 85 dBa @ 3 ft

STANDARD SCOPE OF SUPPLY

Gas turbine engine - equipped with inlet bell mouth and screen.

Gaseous Fuel System, complete and self contained on the unit, with connection on the base plate for customer's filtered, regulated fuel supply.

Generator shipped directly to site by Brush. Brush excitation system with surge protectors and lightning arrestors.

Multistage air inlet filtration system, for both combustion turbine generator and compartment ventilation. Ducting between the inlet air filter and the gas turbine unit. Platforms, handrails, and access between levels within the filter house. This system shall include instrumentation, process skid, support structure, weather hoods, filter system, and intake silencers.

Complete Starting system.

Fire and gas detection and extinguishing system, serving both turbine and generator compartments, complete with 24V DC battery and charger.

Off-line crank wash at cranking speed and on-line water wash system skid mounted or on a cart with all accessories and interconnecting pipe, valves, stainless steel reservoir, piping, and instrumentation.

Local control panel. Unit control panel for indoor mounting in a controlled environment, including microprocessor fuel management and sequencing system, generator metering, vibration monitoring, free-standing HMI and annunciation of alarms and shutdowns, and interface to customer's DCS. All electrical equipment and controls shall be housed in a control/electrical environmentally controlled metal building. A main unit control panel for the turbine generator including governor; fuel management systems; ,programmable microprocessor for sequencing, auto synchronizer, synchronism check relays, protection relays, generator metering, vibration monitoring and annunciation of alarms and shutdowns, and battery and charger assemblies.

Excitation control system, mounted in control panel, with automatic voltage regulator with manual backup, power factor control with remote set point capability, auto following feature, over excitation protection with automatic transfer to manual regulator, volt/Hertz protection, and PMG power supply.

Operating, installation and maintenance manuals. Six sets of drawing and data packages, O&M manuals. Approval Drawings, Certified Drawings, and Operation, Maintenance, and Installation Manuals

Technical services of qualified representatives for technical direction during mechanical and electrical installation. Services shall be provided in accordance with the purchase order.

STANDARD SCOPE OF SUPPLY (CONT.)

Technical services of a qualified representative for operator training shall be provided in accordance with the purchase order.

Fuel firing system, complete and self-contained on the units, to fire. Systems will include connections on the base plate for the Buyer's fuel(s) supply.

I-beam base plates, skid type, for the complete package including the provision to lift the whole assembly.

Acoustic enclosures for the combustion turbine and generator with AC and DC backup internal lighting, redundant ventilation systems and overhead bridge crane. Space heaters to be provided in .generator compartment to prevent condensation during shut down.

Turbine enclosures to have doors to facilitate removal of turbine during maintenance outages.

Lube oil systems for combustion turbine and generator, each with duplex filters, redundant lube oil coolers, and on-skid interconnecting piping. An immersion heater will be provided for the lube system. The lube oil reservoir shall be equipped with a high and low level alarm. An additional low-level alarm shall be interlocked with the electric immersion heater, so that the heater will be de-energized on low level.

DC power system including battery and charger assemblies. Batteries shall be the sealed, maintenance free.

Vibration sensors, seismic type for protection, along with proximity type sensors for monitoring and diagnosis. This includes the monitoring system.

Thermocouples for measuring critical turbine temperature including bearing metal and drains.

Piping and cabling between Seller supplied equipment

Full factory testing and commissioning.

Comprehensive one year warranty.

Generator testing at Brush. Gas Turbine performance testing at manufacturer.

Generator set familiarization / basic operator training course, 5 days at site for up to 10 customer personnel.

OPTIONS

Option 1: Ocean & Inland Freight to Job Site

We can provide shipment of the entire package directly to the site for an additional fee.

Option 2: Fogging System

Fogging boosts engine performance and efficiency using a spray inter-cooling design that significantly increases mass flow by cooling the air during the compression process. The system is based on an atomized water spray injected through spray nozzles placed at two locations, one between the high pressure and low pressure compressors, and the second at the inlet bell mouth. Water is atomized using high pressure air. The water flow rate is metered, using the appropriate engine control schedules and, at the inlet bell mouth and inter-stage portions, on fogging alternate operation based on turbine inlet temperature

Option 3: Evaporative Cooling

For Applications when high dry bulb temperatures are common at low relative humidity, evaporative cooling can be utilized to lower entering DB temperature, thus increasing power output of the package.

Option 4: Inlet Air Anti-Ice

An Anti-Ice System is recommended to allow safe operation during icing/winter conditions. This system includes valves and ducting to direct gas turbine enclosure ventilation exhaust air to the gas turbine inlet air filter.

Option 5: High Performance Heating / Chilling

Combines the Anti-Ice System with inlet chilling for winter and summer operations. Lowering combustion air inlet temperature can increase the kWe output of the generator set.

Option 6: Pulse Filters

Filters pulsed with compressed air for sites with high particulate in the outside air (dust, etc.).

Option 7: HRSG & Steam Production w/SCR

Heat Recovery Steam Generator with Selective Catalytic Reduction to boost power and reduce NOx emissions to less than 25ppmvd.

Option 8: Exhaust Silencer & Stack Assembly

Modified exhaust and larger stack assembly built to customer requirements.

OPTIONS (CONT.)

Option 9a: SCR System with Ammonia Grid

Selective Catalytic Reduction for reduced NOX emissions.

Option 9b: CO Grid

CO system for reduced CO Emissions

Option 10: Black Start System

Includes a 600 kWe diesel generator set and battery cranking system for black starts. The diesel generator provides 480 VAC power for ventilation fans, accessories and starter motor. A larger diesel generator set may be required if a natural gas fuel compressor or other special auxiliaries must be operated during the starting sequence. The black start diesel generator set is furnished in accordance with Manufacturer Diesel Generator Set Specifications.

Option 11: Water Washing

Special option with inlet fogging.

Option 12: Off-base Fin-Fan Coolers

This replaces the standard plate and frame coolers for the lube oil system. A simplex core fin-fan coolers, complete with changeover valve mounted on a separate base plate is supplied. Cooler is dual fan and installed on a separate foundation:

Option 13: Shell & Tube Oil Coolers

This replaces the standard plate and frame coolers for the lube oil system.

Option 14: Natural Gas Fuel System

Standard fuel system.

Option 15: Liquid Fuel System

The gaseous fuel system is replaced by a liquid fuel system. Typical liquid fuels include DFI, DF2, JP4, Naptha, or Kerosene. Customer must supply liquid fuel to the connection at the fuel boost module at 20-50 psig (138-345 kPag) and at least 200F (110C) above the wax point temperature. Customer supplied fuel must be clean, filtered and meet the fuel specifications. Customer must supply interconnection piping from boost module to main base plate.

OPTIONS (CONT.)

Option 16: Dual Fuel System

When specified, the package is field retrofitted with two independent fuel systems. This could include two gaseous fuels, two liquid fuels or one gaseous and one liquid fuel. Changeover may be initiated manually at the unit control panel, or automatically, if the operating fuel supply pressure should gradually decrease..

Option 17: Steam Injection System

A steam injection system is required in conjunction with the HRSG option to boost power and decrease NOx emissions.

Option 18: Water Injection System

For applications with NOx emissions limitations, water injection may be required. A water injection system consists of inlet strainer, valves, piping and controls. Customer must provide a supply up to 55 gpm of purified water on gas fuel and up to 78 gpm of purified water on liquid fuel per water specifications to the water injection skid at 5 to 50 psig (34.5 - 345 kPag). The minimum customer supplied pressure and temperature determined by the water injection rate required and the type of fuel nozzle utilized.

Option 19: Smart Extra Computer & Printer

Manufacturer can furnish a remote workstation, as part of the control system. The module consists of high performance desktop PC system equipped with a serial port for communication with the control system, animated graphical displays of the turbine, generator, and auxiliary system analog and digital parameters, historic logging and trending system that can store/display up to 30 days of historical data, periodic reports, and capability to start, stop, and control the gas turbine generator system.

Option 20: Modular Control Room

We can furnish an insulated and air conditioned modular control room (25', 35', or 50' as requested) to house the control panel and all of the electrical equipment normally required for the gas turbine.

Option 21: Switch2ear

We can supply the generator circuit breaker and related switchgear as a part of our equipment scope. Equipment will conform to manufacturer Switchgear Specifications

OPTIONS (CONT.)

Option 22: Generator Protective Relays

The package is supplied with a microprocessor based generator protective relay module, mounted in the turbine control panel. Protective relay system includes all functions necessary for protection of the generator.

Option 23: Unit Motor Control Center

A freestanding lineup of motor controls for all motors furnished by manufacturer can be supplied. The MCC is suitable for indoor installation to optional modular control room or other non-hazardous are in accordance with manufacturer Specifications.

Option 24: Gas Turbine Operatin2 Spares

Option 25: Generator Operatin2 Spares

Option 26: Fire Protection Spares packa2e

Option 27: Couplin2

Coupling Spares

Option 28: Black Start Spares Package

Option 29: Startin2 System Spares Package

Option 30: Air Filter Spares Package

Option 31: Lube Oil & Fuel Filters Spares

Option 32: DC Enclosure Li2htin2

Manufacturer will furnish DC emergency lighting in the turbine and generator enclosures as an option. DC lights turn on if AC power fails.

Option 33: Ni-Cad Batteries

Manufacturer will furnish nickel-cadmium batteries as an option to replace the lead-calcium batteries.

OPTIONS (CONT.)

Option 34: Water Treatment System

Manufacturer can provide a complete water treatment system designed to meet the quantity and quality requirements essential for optimum performance of the Gas Turbine Generator Package. Due to the variance in feed water quality, the base equipment package includes coarse and fine cartridge filters, reverse osmosis, de-ionization, and ancillary equipment. Pretreatment options are available for high turbidity, harness, and iron. Remote monitoring is offered as an option to provide minimal operator interface.

Option 35: 60 to 50Hz Packa2:e·

For operations that require 50Hz, Manufacturer can provide a reduction gearbox.

Option 36: Marinized Package and Turbine

For operations with high salt/air content, manufacturer can provide a Marinized package and turbine. These special coatings protect the package and turbine from corrosion due to high salinity of the outside air.

Option 37: Mechanical Drive System

Manufacturer can supply a package designed for any mechanical drive requirement (air compressor, marine drive,

etc.).

Option 38: Exhaust Water Recovery System

Manufacturer will furnish an Exhaust Water Recovery System for a Steam Injection Package that is scheduled for locations that have water supply problems.