

UNUSED TM2500+ MOBILE DUAL FUEL 50/60HZ. GAS TURBINE GENERATOR PACKAGES

I. THREE (3) UNITS

UNUSED X TM2500+ MOBILE DUAL FUEL 50/60HZ. GAS TURBINE GENERATOR PACKAGES

Seller is offering Three (3) Unused X TM2500+ Mobile Dual Fuel 50/60Hz. Gas Turbine Generator Packages () available for immediate sale as a result of a cancelled offshore project, and which are unused, tested and stored in the USA. Serial numbers will be supplied at expression of interest.

Technical Scope of Supply – as noted below. Engineering, Installation and commissioning services are available under separate contract.

Condition – New Unused , and tested, all new systems. All GE test reports and certifications available to qualified customer. Manufactured in 2014.

Inspection - Immediately after verification of bank references and credit

Availability – (50Hz or 60Hz.) ready to ship within 3-4 weeks after full payment

Payment Terms - Ex works – 100% on collection

Warranty – Negotiable One Year Full Package.

Technical Field Support Services and Operator Training.

II. TECHNICAL SCOPE OF SUPPLY

TM2500+

Three (3) TM2500+ Mobile Gas Turbine Generator Sets

Each TM2500+ consists of two trailers and auxiliary equipment described below. The trailers include the main trailer and auxiliary trailer. The inlet air filter assembly and exhaust duct assembly ship loose, and are assembled onto the main trailer during commissioning. In addition to the above, Seller will ship spare parts and tools as required. The trailers and auxiliary equipment is described in more detail below.

One TM2500+ unit is a Unit (The three (3) Units in this offering make up the equipment ("Equipment."))

1.1 Main Trailer

The main trailer consists of the following components:

Main Trailer and Jeep

A seven-axle, air ride suspension trailer (3+4) and a 3-axle jeep are used to transport the main trailer components. The trailer and jeep combination is approximately 108' (32.9m) long (less tractor) during transport and weighs approximately 210,000 pounds (95,254 kg) fully loaded. At the jobsite, the jeep and trailer gooseneck are

removed as well as the 3 rear axles of the trailer. With these pieces removed, the main trailer is approximately 68.25' (20.8m) long during operation, measured from the plenum on one end to the footing on the other. Ten landing legs are provided to support and level the equipment at the jobsite. Appropriate site foundation is not part of the scope of supply.

Gas Turbine

The gas turbine is a General Electric LM2500 PKMDW model ISO rated for continuous duty and configured for operation on either natural gas or liquid fuel. Each is configured for optional water injection for NOx reduction, if required. Altitude, humidity, and inlet and exhaust losses will affect power output and heat rate. In addition to the inlet air filter, the engine is equipped with a stainless steel mesh screen in the inlet air stream for "last chance" protection against foreign object damage. The engine is shock mounted for shipping and shipped in position, with the exception of the coupling spacer, which is installed during commissioning.

Generator

The generator is an air-cooled, open air, 2-pole, 50/60 Hz, 0.85-.99 PF (lagging) capable Brush generator. The generator includes a brushless excitation system with permanent magnet generator. Neutral, line side cubicles, medium voltage switchgear are included. The generator is hard mounted to a base on the main trailer and includes generator air inlet filtering and air silencing. The generator is operated at class F temperature rise.

Turbine Enclosure

The equipment package is supplied with a weatherproof acoustic enclosure for the gas turbine. The enclosure is completely assembled and mounted over the equipment prior to testing and shipment. Provisions for turbine removal and personnel access are included. The turbine compartment is fully ventilated by 2 x 50% ventilation fans (provided in the air filter).

Fuel System

The gas turbine, auxiliary equipment, and controls are all configured for gas, liquid, or dual fuel operation.

The TM2500+ is supplied with a natural gas fuel system using an electronically controlled fuel-metering valve. For full-load operation, the gaseous fuel must be supplied to the Auxiliary Trailer skid connection at: 320 MMBtu/hr Max; 180 °F [82 ° C]; Max; 520 +/- 20 PSIG (3,585 +/- 138 kPaG); and filtered to 5 or less Microns. The buyer must provide gas fuel that is clean, filtered and compliant with General Electric specification MID-TD-0000-1.

The package is also equipped with a liquid fuel system. Typical liquid fuels include DF1, DF2, or JP4. For full-load operation, buyer must supply liquid fuel to the connection at the Auxiliary Trailer Skid at 40 GPM (151.4 L/min), 30 ± 10 PSIG (207 ± 69 kPaG), filtered to 5 Microns and at least 20°F (11°C) above the wax point temperature. The buyer must provide liquid fuel that is clean, filtered and compliant with General Electric specification MID-TD-0000-2.

Technical Data*				
	60Hz		50Hz	
Water injection (NOx= 25 ppmvd@15% O ₂)	None	Yes	None	Yes
Output (MW)	30.688	30.988	26.190	26.190
Heat rate (Btu/kWh)	8,830	9,285	9,246	9,705
Heat rate (kJ/kWh)	9,316	9,796	9,755	10,239
Efficiency (%)	39	37	37	35
Pressure ratio	22.5	22.8	21.2	21.3
Power turbine speed (RPM)	3,600	3,600	3,000	3,000
Exhaust flow (lb/sec)	192.2	196.6	184.5	187.2
Exhaust flow (kg/sec)	87.2	89.2	83.7	84.9
Exhaust temp (F)	959.1	906.0	925.0	879.0
Exhaust temp (C)	515	485.6	496.1	470.6

*60 Hz based on a Brush air-cooled generator w/brushless excitation @ 0.90 PF, 59°F cooling air, 13.8 kV (50 Hz @ 11.5 kV), Ambient air: 59°F, 60% RH, Sea level

All necessary shutoff valves, flow meter, piping and instruments between the Auxiliary Trailer Skid connection and the engine are included. Buyer must provide supply piping with sampling ports, fuel system filtration and applicable shut-off valves and containment per local codes and standards.

Water Injection System

The equipment package is capable of water injection for NO_x reduction. For full-load operation, the demineralized water must be supplied to the Auxiliary Trailer Skid connection at 28 GPM (106 L/min), 15 PSIG (103 kPaG] Minimum, 40 to 140 °F (4 to 60 °C) filtered to 10 Microns. The buyer must provide demineralized water that is clean, filtered and compliant with General Electric specification MID-TD-0000-3.

All necessary shutoff valves, flow meter, piping and instruments between the Auxiliary Trailer Skid connection and the engine are included. Buyer must provide supply piping with sampling ports, fuel system filtration and applicable shut-off valves and containment per local codes and standards.

Lube Oil Systems

The equipment package is supplied with two separate lube oil systems; one for the gas turbine and one for the generator. The oil reservoirs and piping are all stainless steel, and the lube oil system valves have stainless steel trim. Each lube oil system has a pump, simplex filters, necessary valves and instrumentation, and

thermostatic-controlled electric heaters. A dual fan, single core fin fan cooler is provided to cool turbine, generator lube oil and hydraulic oil. The cooler is mounted on the Auxiliary Trailer and the rest of the lube oil systems are mounted on the Main Trailer. Buyer must provide any additional containment per local codes and standards.

Switchgear

The equipment package is supplied with a 3 section NEMA 3R switchgear enclosure. The switchgear includes a set of generator circuit breaker equipment, 2 sets of incoming line voltage monitoring equipment, a marshaling cabinet and a set of switchgear accessories. Permanent cable terminations from the neutral and line-side of the generator are also included.

1.2 Auxiliary Trailer

The Auxiliary Trailer is approximately 48' (14.6 m) long and 8'-6" (2.6 m) wide and weighs approximately 62,000 pounds (28,122 kg) fully loaded. The trailer is provided with a tandem air ride suspension and includes the equipment listed below. Four landing legs are provided to support and level the trailer at site.

Auxiliary Trailer Skid

The Auxiliary Trailer Skid includes fuel and water injection system components not mounted on the main trailer. The pumps, filters and necessary instrumentation are connected to the main trailer components at site with interconnect hoses. The Auxiliary Trailer Skid also includes the hydraulic start system and water wash system described below.

Electro-Hydraulic Start System

The equipment package is supplied with a hydraulic starting system, which includes an electric motor driven hydraulic pump assembly, filters, and a fin/fan heat exchanger mounted on the auxiliary equipment module. A hydraulic motor is also mounted on the gas turbine accessory gearbox to turn the gas generator shaft. All piping and fittings on the base plates, plus hydraulic connections between the auxiliary equipment module and the main base plate are also furnished.

"Off Line" Soak Wash System

The equipment package is supplied with an "off-line" cleaning system, with a water wash reservoir and all necessary filters and instrumentation supplied. Buyer is required to provide purified water to the standards listed in the water injection system.

Fire Protection System

The equipment package is supplied with an installed fire protection system complete with hydrocarbon sensing and thermal detectors, piping and nozzles in the engine compartment. The fire protection system includes cylinders containing CO₂ mounted on the Auxiliary Trailer. An included 24 VDC battery and charger powers the fire protection system (located in the control house.) All alarms and shutdowns are annunciated at the unit control panel. An alarm sounds at the turbine if the gas detectors detect high gas levels, or if the system is preparing to release the CO₂. When activated, the package shuts down, and the primary CO₂ cylinder is discharged into the turbine compartment via multiple nozzles, and the ventilation dampers automatically close. After a time delay and if required, the reserve supply of CO₂ is discharged.

Fin Fan Cooler

The equipment package is supplied with a 100% redundant dual fan, single core cooler with separate coils for the turbine, generator lube oil and hydraulic oil. The cooler is equipped with all interconnect piping and instrumentation necessary for the three circuits.

Control House

The basic equipment package is supplied with a lighted, insulated 22' (6.7 m) long by 8'-6" (2.6 m) wide control house. The control house is equipped with an access door, air conditioner/heater, and a hand held fire extinguisher. The control house is used to package the equipment listed below.

Digital Control System

The control system features an integrated electronic fuel management system with a programmable sequencer, vibration monitor, fire system monitor, digital meter, and a digital generator protective relay module. A desktop or laptop PC with separate workstation and chair is provided for HMI control. Alarm and shutdown events are displayed on the HMI automatically. A dedicated 24V DC battery system with power charger is included in the control house.

Generator Protective Relays

The equipment package is supplied with two (2) Integrate Generator Protection System (IGPS) microprocessor-based relay modules, mounted in the turbine control panel. One IGPS is configured for 50Hz and one IGPS is configured for 60Hz. The appropriate IGPS will be selected for use at Site. The IGPS includes all functions necessary for protection of the generator.

Unit Motor Control Center

A freestanding lineup of motor controls for all TM2500+ package motors is supplied. The motor control center is installed in the control house and also includes a 45 kVA lighting and distribution transformer.

Battery and Charger System

The equipment package is supplied with a 24 VDC NiCad battery system for control power and fire system and charger for each. In addition a 125 VDC NiCad battery system with charger is supplied for the generator lube pump. The 125VDC battery charger has a selector switch to receive power from either the MCC or an external generator to charge the batteries. The battery systems are fully wired and mounted in racks and are installed in the control house along with the wall-mounted chargers.

1.3 Gas Turbine Air Filter Assembly

The air filter is approximately 27'(8.2 m) long and 10'-11" (3.33 m) wide and weighs approximately 20,000 pounds (9072 kg) fully loaded. The air filter is equipped with a two-stage filtration system for both ventilation and combustion air with panel type pre-filters housed in hinged doors and high efficiency barrier filters. The air filter includes weather hoods installed in front of the filtration system and inlet silencers. An inlet plenum with hatch is provided for access to the FOD screen for maintenance. Ventilation fans for the turbine enclosure are installed in the air filter assembly. Two 50% fans and a bypass damper are installed. All of the items listed are housed in the filter house that is complete with an access door for maintenance, separate air paths and turning vanes and the necessary instrumentation. For connection to the Main Trailer, the air filter is hard mounted directly on top of the combustion and ventilation inlet plenum.

1.4 Gas Turbine Exhaust Assembly

The exhaust is approximately 17'(5.2 m) long and 10'-3"(3.1 m) wide and weighs approximately 20,000 pounds (9,072 kg) fully loaded.

1.5 Grounding

Each trailer is supplied with grounding pads for inter-connection between each trailer to a grounding grid. Completing the trailer-to-trailer ground inter-connection the connections to site grounding grid are not included. The grounding grid must be compliant with the General Electric "Specification for Grounding of Mobile Generation Unit."

1.6 TM2500+ Original Design Information

Ambient Design Limits: 41F (5C) to 122F (50C)

Seismic Design Criteria (GTG Package): IBC 2009, site class D, occupancy category III, seismic design category C, Occupancy importance factor 1.25, response modification factor 2.5, Spectral Response Acceleration: at 0.2 sec-g 0.48, Spectral Response Acceleration: at 1 sec-g 0.20, g levels, Base Acceleration = 0.24

Maximum Wind Speed (Wind Load): 75MPH

Roof Live / Snow Load: 20 PSF

Near Field Noise at 3 ft horizontal and 5 ft vertical: 90 dB(A) arithmetic average

1.7 Remote Monitoring and Diagnostic Service Capability

Monitoring and Diagnostics Service helps plant operators improve their availability, reliability, operating performance, and maintenance effectiveness. 24x7 equipment monitoring of key parameters by factory experts may lead to early warning of equipment problems and avoidance of expensive secondary damage. Diagnostic programs seek out emerging trends on the Equipment; prompting proactive communications to avoid forced outages and extended downtime. During the Warranty Period, the proactive communication process includes a 24x7 call center (known as Quick Response Center) consisting of highly skilled technical representatives who can immediately begin assessing and diagnosing an Equipment problem on the phone. These technical representatives are trained to be able to remotely provide the same high level of troubleshooting support that customers would receive from an on-site controls technician.

The ability for the Quick Response Center team to remotely view real-time operating data via the Monitoring & Diagnostic service accelerates troubleshooting of the Equipment. As part of the execution of the Monitoring and Diagnostic Service, Buyer will provide, if requested by Seller, a high-speed connection to the internet and IT support in the configuration of the Virtual Private Network (VPN) as required for installation and for connection to Seller's remote monitoring center during the installation, commissioning, and Warranty Period.

Training.

One "Aero Package Operations / Familiarization" training class and one "Aero Gas Turbine Package System Maintenance training class each consisting of one-week duration for training of up to 15 operators and are more fully described in Attachment 13, Training Class Descriptions.

Performance Testing.

Performance testing of the Equipment including two mobilizations for the performance testing team as more fully described in Attachment 2, Performance Testing Services.

Balance of Plant Advice.

GE will provide one engineer to offer technical advice and consultation in regard to the Buyers mechanical balance of plant (which includes liquid fuel, water, and all interconnections between the Buyer's balance of plant and the Equipment) design, scope, procurement, installation and commissioning via phone calls and/or email and for up to two trips to each of the four Sites between the Effective Date and the date that the Equipment is commercially operational. Each trip will be a maximum of 5 calendar days.