

Scope of Supply 1 x SGT-400 GTG



POWERING BUSINESS. EMPOWERING PEOPLE

12.9MW Mobile Generator Set	SIEMENS
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SGT-400 Mobile Scope of Supply (1 x ea. of following):

SIEMENS Energy Inc. offer to design, manufacture, package and despatch the following equipment listed within this scope of supply.

Driven Unit

Generator

1800 RPM, Conventeam Brushless AC Generator
 12.9MW, 13.8kV, 3 phase, 4 pole, 60Hz, 0.8 power factor, salient pole
 14015 kVA / 11212 kW
 Class F insulation, Class B temp rise
 TEAAC Generator cooling system
 NEMA 4 terminal boxes
 Onshore 2-coat paint system
 Pfisterer MV connectors

Certifications:

- Non-Hazardous, Safe Area rated
- NEMA MG1

Design Criteria:

VPI Stator
 Damper Windings
 Six (6) Leads for differential protection
 (1) Shaft bearing to be insulated
 (2) 100 ohm, Platinum Bearing RTD's

2 x grounding pads
 Space heaters
 (6) Stator RTD's (2 per winding)
 Brushless exciter with space heater
 Auxiliary box

Line box with:

Earthing and grounding clamps
 (3) D/P CT's
 (3) Generator protection CT's
 (1) Cross current CT (AVR)
 (1) Neutral CT after the star point

Standard Documentation:

General arrangement drawings
 Main Terminal box drawings
 Rotor drawings
 Critical speed figures
 Electrical schematics
 Equipment datasheets & Curves
 Test procedure & Certificate
 O & M Manuals (English language, set)
 20 year Maintenance schedule
 Spares lists

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Gas Turbine Package

Dual Fuel Gas Turbine Engine

Core Engine - twin shaft design
 Nominal rating 12.9MWo
 Dry Low Emissions (DLE)
 11 Stage, axial flow compressor (16.7:1)
 Variable Guide Vanes and stators
 (6) Reverso flow combustion chambers
 (2) Stage, compressor turbine
 (2) Stage Power Turbine
 Hot Gas Interduct
 Power Turbine Rotor

Power Turbine Stator
 Output Shaft Drive
 Exhaust Outlet Casing
 Engine Bearing Temperature Instrumentation
 Engine Vibration Detector
 Engine arranged for hot end drive
 Automatic fuel changeover by an load
 Till Pad journal and thrust bearing

Gas Turbine Skid (Underbases)

Fabricated carbon steel construction
 Gas Turbine Skid - Mounting assemblies for the gas turbine core, auxiliary gearbox, main gearbox
 Generator Skid - driven unit
 Standard multiple point mount system
 Integral carbon steel lubricating oil tank

Start System

Hydraulic Motor and Pump - AC electric motor driven

- 10kw, TEFC, Zone 2
- IEEE841, NEMA

Lubricating Oil System

Gas turbine lubrication system utilizes VG46 lubricating oil
 Lubricating Oil System serving the turbine, gearbox and driven unit
 Lubricating oil module transmitters - Siemens standard smart type - Aluminum bodies
 Lubricating oil tank immersion heaters
 Lubricating oil system breather & Mist Eliminator
 Lubricating oil pumps:

- Main Oil Pump - Turbine gearbox driven
- Auxiliary Oil Pump - AC motor driven with CSA space heater
 - o 22kw TEFC, 480vac, Zone 2
- Emergency Oil Pump - DC motor driven from UPS System
 - o 75kw TEFC, 24vdc zone 2

Lubricating Oil Filter - Duplex - carbon steel body non-ASME

- 2 x 99% @ 10 micron

Lubricating oil system cooler

- Air cooled, fin / fan heat exchanger (Non-API)
- 1 x 100% Capacity cooling fan
- 480vac, Safe area fan motor

Scope of Supply (cont'd)

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<p>Gears, Couplings and Guards</p> <p>Main Reduction Gearbox</p> <ul style="list-style-type: none"> 16.630kw, Star type Epicyclic, output shaft speed 1800 rpm <p>Auxiliary Gearbox</p> <ul style="list-style-type: none"> Attachment drives for start system and lubricating oil pump <p>Driven unit coupling, flexible element dry type</p> <ul style="list-style-type: none"> Coupling guards – non-sparking Torque limiting device 	
<p>Gas Fuel System</p> <p>316L Stainless steel piping and Swagelok double ferrule compression type fittings</p> <p>Pilot fuel flow control system with actuator</p> <p>Main fuel flow control system with actuator</p> <p>12 Rapid-acting gas shut-off valves</p> <p>Pressure transmitters - Siemens standard smart type – Aluminum bodies</p>	
<p>Liquid Fuel System</p> <p>AC motor driven liquid fuel pump</p> <ul style="list-style-type: none"> 22kw, TEFC, 460vac, Zone 2 <p>Duplex type, 10 micron, liquid fuel filter complete with differential pressure transmitter</p> <p>On-skid fuel piping in stainless steel downstream of filter</p> <p>Shut-off valves</p> <p>Liquid fuel grounding</p> <p>Independent control of primary, secondary and tertiary liquid fuel flows</p> <p>Propane/LPG start assist kit included for operation on liquid fuel</p>	
<p>Acoustic Enclosure</p> <p>2-coat, painted carbon steel acoustic enclosure over the entire gas turbine</p> <p>2-coat, painted carbon steel doors and 304SS hardware for personnel access and maintenance</p> <p>Integral equipment lifting beam for maintenance</p> <p>Integral support for combustion air inlet system and ventilation system</p> <p>AC Internal lighting</p> <p>Acoustic system transmitters - Siemens standard smart type – Aluminum bodies</p> <p>Aluminum unpainted control panel weather canopy</p>	
<p>Designed basis:</p> <ul style="list-style-type: none"> 85 decibels or less @ 3 feet Internal area classification to meet Zone 2 	
<p>Acoustic Enclosure Ventilation System</p> <p>2-coat carbon steel air inlet grill and weather hood</p> <p>2-coat carbon steel ventilation air inlet and galvanized outlet ducting and silencer</p> <p>Air actuated, galvanized steel vent dampers and blades</p>	
<p>1 x 100% negative pressure ventilation fan</p> <ul style="list-style-type: none"> Zone 2, 460v fan motors with marine grade aluminum impellers 30kw, TEFC, NEMA Anti-condensation heaters 	

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<p>Combustion Air Inlet System</p> <p>2-coat, painted carbon steel, automatic pulse type, self-cleaning filters</p> <p>2-coat, painted carbon steel, weather hood and filter assemblies</p> <p>2-coat, painted carbon steel ducting, silencer and transition pieces</p> <p>Flexible expansion joint</p> <p>Integral support for combustion air inlet system</p> <p>Stages accessible through a hatch in weather hood with lighting</p> <p>PDT transmitter – Siemens smart transmitters – Aluminum bodies</p>	
<p>Combustion Exhaust System</p> <p>304 stainless steel expansion joint</p> <p>304 stainless steel exhaust diffuser, and silencer, cold supports to be carbon steel</p> <p>Aluminum exhaust cladding for personnel protection only</p>	
<p>Fire Protection System</p> <p>Det-Tronics Safety Systems Controller</p> <p>3 x Multispectrum Flame Detectors</p> <p>2 x Heat Detectors</p> <p>2 x gas detectors in ventilation outlet</p> <p>Sounder / Beacon Unit & Status Indicator with a bottle weigh station</p>	
<p>Fire Extinguishant</p> <p>Twir-Shot CO₂ fire protection system GT enclosure only</p> <p>Cylinders housed in a weather proof rack</p> <p>Extinguishant system distribution pipework and nozzles</p> <p>Enclosure interior piping - cabinet to package piping by others</p>	
<p>Package Auxiliaries</p> <p>Water wash part for hot and cold wash of turbine compressor</p> <p>Internal auxiliary drain tank</p> <p>Siemens smart transmitters – Aluminum bodies</p> <p>Instrument tagging – Arrow tags - Siemens standard P&ID references</p> <p>Package finish to Siemens on shore standard</p>	
<p>Trailers</p> <p>(1) 3 Axle gooseneck trailer containing:</p> <ul style="list-style-type: none"> Gas turbine Package Lube oil cooler Fire extinguisher cabinet Water wash module <p>(1) 5 Axle Trailer containing:</p> <ul style="list-style-type: none"> Generator Main reduction gearbox 	
<p>Control System</p> <p>Onskid turbine controls consisting of:</p> <p>Siemens SIMATIC PCS7 400 PLC platform</p> <p>Siemens SITRANS P DSIII Pressure Transmitters</p> <p>Siemens SITRANS TH200 Temperature Transmitters</p> <p>Siemens SITRANS LG200 Wave Guide Level Transmitters</p> <p>Siemens SIMATIC NET Industrial Ethernet (SCALANCE X-100)</p> <p>Rosemount 68 and Smart Sensors (SS) RTD(s)</p> <p>Bentley Nevada 1701 Machinery Protection System</p>	

Scope of Supply (cont'd)

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<p>Onskid Generator Control Panel consisting of: Automatic voltage regulator (Dual redundant) Automatic & manual synchronizer control Generator metering and electrical protection Active / Reactive load share controller Generator breaker and (1) Bus tie control Safe Area rated</p>		
<p>Operator Interface: Remote cabinet mounted Siemens PC with Video Display Unit, keyboard and mouse Operator display language – English language (Spanish Option available) Safe Area rated</p>		
<p>Local Equipment Room Container (12.2m Long x 3.0m wide x 3.2m High) of carbon steel construction External walls of corrugated carbon steel sheet Internal Rockwool insulation</p>		
<p>Containing the following equipment:</p>		
<ul style="list-style-type: none"> Motor Control Center Fire Suppression and Alarm Panel Battery Cabinet with lead acid batteries Battery Tripping Unit and Batteries Inter Panel Cabling Auxiliary Transformer Medium Voltage Switchgear Neutral Earthing Resistor 	<ul style="list-style-type: none"> Auxiliary Control Panel Power and Lighting Distribution Board Diesel Generator for LER power distribution GPS Enclosure/Junction Box Fiber Optic Panel LV Connector Junction Boxes Elliott Bushings for feeders Pfisterer MV connectors 	

Additional BOP:

1. 1 x Kohler 1MW Blackstart Diesel Gen Set
2. 1 x IR Air Compressor Assembly
3. 1 x set Siemens special tools
4. 1 x Auxiliary Transformer

Not Included:

1. Quick-disconnect cabling between aux skids and main unit



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