

TECHNICAL SCOPE DOCUMENT

Presented To:

EDC

For

LM6000 PC 90MW

LaRaisa Power Plant

By



Proposal T-9036
July 27, 2009

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EDC**

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Section 1.0 Introduction

ProEnergy EPC is pleased to provide this Technical Proposal to furnish and install a nominal 98 MW Gas Turbine Simple Cycle Power Plant addition to the LaRaisa Power Plant. These Gas Turbine packages will be installed adjacent to the (2) proposed future M501 GTGs.

This turnkey proposal includes installing the following Owner supplied equipment:

- Two (2) gas fueled GE LM 6000PC gas turbine generator packages

ProEnergy EPC will furnish all engineering, required balance of plant equipment, contract locally for the required subcontractors to accomplish the site construction, construction tools, equipment rental, project management, commissioning, start-up, and performance testing. It is our intention to manage the project schedule to assure the results per the mutually agreed upon terms of the EPC Contract. This Technical Scope Document will become an exhibit to the EPC Contract.

Associated with this proposal, **ProEnergy would like to provide its O&M Services proposal for your consideration.**

THIS DOCUMENT IS CONFIDENTIAL. IT IS DESIGNED AND INTENDED FOR EDC'S USE. THIS DOCUMENT IS FOR THE SOLE PURPOSE OF EVALUATING PROENERGY EPC SERVICES' PROPOSAL FOR THE (2) GE LM 6000 PC POWER PROJECT ADDITION.

Section 2.0 Scope of Work and Equipment

The Scope of Work and Supply is comprised of the following outlined items:

Major Generation Equipment

The installation of two (2) each Owner Supplied GE LM 6000 PC gas turbine generator packages are complete with turbine control panels, auxiliary skids and inlet filters. Note: These units do not include motor control centers, modular control rooms or exhaust stacks. These will be included in the balance of plant supplied by the Contractor.

GE LM 6000 interface points are as follows:

Equipment System	General Electric
<ul style="list-style-type: none"> All supply piping, including Fuel Gas, Liquid Fuel, Demineralized Water, Lube Oil, Compressed Air, Instrument Air, and Inlet Air Chilling 	<ul style="list-style-type: none"> Flanged or threaded connection on GE LM 6000 GTG base plates.
<ul style="list-style-type: none"> Inlet Air-to-Filter 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine/Generator Ventilation Air 	<ul style="list-style-type: none"> Atmosphere
<ul style="list-style-type: none"> Turbine Exhaust 	<ul style="list-style-type: none"> Flange & Expansion Joint for connection to Exhaust Stack
<ul style="list-style-type: none"> Instruments on the LM 6000 Base plate 	<ul style="list-style-type: none"> Terminal box on base plate
<ul style="list-style-type: none"> Instrument wiring in Turbine Control Panel 	<ul style="list-style-type: none"> Terminal in Turbine Control Panel
<ul style="list-style-type: none"> High Voltage Connections 	<ul style="list-style-type: none"> Bus bar in LM 6000 generator line side cubicle
<ul style="list-style-type: none"> Generator Ground Connections 	<ul style="list-style-type: none"> LM 6000 Neutral cubicle
<ul style="list-style-type: none"> Electric Motors 	<ul style="list-style-type: none"> With cables & conduits from Control Module
<ul style="list-style-type: none"> Ladders and Platforms for Air Filter 	<ul style="list-style-type: none"> Ladders and Platforms for Inlet Air Filter and Vent Fans

2.0 Balance of Plant

The contractor will design and install the facility as described in the following sections of this document and as clarified in the associated Clarification Document included in Section 12. The design will include the necessary Structural, Mechanical, Electrical, Instrumentation, and Control System to install the above Major Equipment.

The Balance of Plant scope of supply will be comprised of the following:

- Contractor will provide complete design of the facility including civil, structural, buildings, mechanical, electrical, instrumentation and control
- Contractor will provide concrete foundations, plant gravel, and access roads
- Owner is providing a reasonably level site which Contractor has visited and based its plant layout on
- Owner is providing an entrance road to the site which Contractor has visited.
- Owner will provide (2) 13.8 KV to 230 KV, 60 MVA GSU Transformers
- Contractor will procure from a Venezuelan supplier, oil for the (2) GSU Transformers
- Contractor will provide Installation of the complete Power Plant with the inter-ties as described later in this document and including:
 - Mechanical installation of the various items of equipment with the associated inter-ties of, gas fuel, liquid fuel, sanitary sewer, and waste water
 - Electrical installation of the plant including the 13.8Kv interconnect cable, plant electrical for BOP equipment, area lighting, grounding, lightning protection, and cathodic protection
 - Installation of Instrumentation and Control System including plant instrumentation, metering, and Plant remote DCS PLC

2.1 BOP Major Mechanical Systems

2.1.1 Simple Cycle Exhaust Stack

The Contractor will supply and install 45 ft. exhaust stacks in accordance with the standards set out by GE for each LM 6000 machine.

2.1.2 Plant Fuel Gas System

The Contractor will install the plant fuel gas system outlined as follows:

- Interconnect to PDVSA gas metering station above ground at the Plant boundary as described on the Plot Plan
- Install two (2) redundant coalescing filter separators on a common skid including redundant pressure regulators
- Furnish and Install the fuel gas compression plant with two (2) ea. 100% Gas Compressors to raise the available supply pressure to the required 650 psi. supply pressure to the gas turbines

- Install all plant fuel gas carbon steel piping, valves and fittings from plant inlet fuel gas interconnect to the fuel gas regulator filter
- Install stainless steel piping from the fuel gas filter to the gas turbine generator

2.1.3 Plant Liquid Fuel System (Not Included in this Proposal)

At EDC's option and as a change order, the Contractor can offer to design, supply, install and interconnect with the existing plant liquid fuel system outlined as follows:

- Supply and Install a Liquid Fuel Treatment System expansion
- Supply and Install two (2) 50% capacity liquid fuel forwarding pumps
- Supply and Install two (2) 100% capacity liquid fuel filter/regulator skids
- Supply and install all additional liquid fuel Stainless Steel piping, valves and fittings from the plant treated liquid fuel day storage tanks to the liquid fuel filter regulator skids
- Supply and Install two (2) liquid fuel injection pump skids
- Supply and install Stainless Steel piping, valves and fittings from the liquid fuel filter regulator skids to the Gas Turbine Generator package fuel connection

2.1.4 Water and Demineralized Water System

Contractor will Supply and install the plant Water Treatment System expansion outlined as follows:

Contractor Supplied Equipment

- Supply and Install an expansion to the Multi-Media filter and R.O. systems
- Supply and install GE EDI Demineralized system addition as required to meet the GE engine specification
- Provide and Install two (2) 50% capacity Demin water forwarding pumps
- Provide and Install two (2) 100% capacity Demin Water filter/regulator skids
- Provide and install all plant Demin water Stainless steel or HDPE piping, valves and fittings from the plant Demin Water storage tanks, to the Demin injection pumps and to the (2) Demin water injection connections at each of the GE LM 6000 GTGs

2.1.5 Oily Water Drain System – as provided with FT8 Plant

The Contractor will furnish and install the oily water drain system as follows:

- Furnish and install PVC or HDPE below ground piping and fittings from concrete oil containment units located at:
 - 1) All Transformers
 - 2) Gas Turbine Generator Auxiliary Skids

Piping is to be routed to the oily water separator and then to the waste oil storage tank. Provisions are to be made to pump out the waste oil to a truck for disposal, which will be provided by the Owner.

2.1.6 Plant Fire Water System

The Contractor will furnish and install a header expansion to the Firewater System that includes:

- Furnish and Install headers routed throughout the plant in accordance with NFPA Codes. All piping to be carbon steel.
- Monitors and Hydrants installed in accordance with NFPA Codes
- Portable fire extinguishers as required

2.1.7 Instrument and Service Air Systems

The instrument and service air systems will be as follows:

- Furnish and install one (1) set of two (2) instrument and service air screw compressors with associated dryer and air storage tanks
- Furnish and install Stainless Steel tubing, valves, fittings and instruments for instrument and service air systems from the air compressors to various required areas throughout plant for instrument air and service air. Furnish the appropriate quick connect connectors

2.2 BOP Electrical Systems

2.2.1 13.8 KV System

The Contractor will perform the following work on the 13.8 KV system:

- Install two (2) Contractor furnished 13.8 KV 3,000 amp generator circuit breakers with PTs and CTs
- Furnish and install all 13.8 KV cabling, bus work, cable tray etc. from the generators to the generator circuit breakers.
- Furnish and install two (2) 13.8 KV 1200 A Feeder Breakers
- Furnish and install all five (5) fused disconnects for auxiliary transformer

2.2.2 13.8/4.16 KV System

The Contractor to provide the following:

- Furnish and install one (1) 13.8KV / 4160V auxiliary power transformer for the fuel gas compressors

- Furnish and install four (4) 13.8KV / 480 volt auxiliary power transformer
- Furnish and install three (3) 4160 V MCCs for Gas Compressors

2.2.3 480V System

The Contractor will provide the 480V system as follows:

- Furnish and install one (1) 480 V water MCC
- Furnish and install two (2) 480 V GTG MCC
- Furnish and install one (1) 480V Gas Compressor MCC
- Furnish and install cable tray / conduit with cabling from transformers to MCCs and from MCCs to plant 480V equipment and motors
- Furnish and install underground conduit, duct banks, or overhead cable tray mounted on the pipe racks

2.2.4 120/208 System

The Contractor will provide the 120/208 system as follows:

- Furnish and install 480V/120/208V transformers, distribution panels and lighting panels as required with associated conduits, fittings and wire.

2.2.5 Plant Area Lighting

The Contractor will provide the plant area lighting as follows:

- Furnish and install area lighting consisting of two (2) 25 ft galvanized metal poles with two (2) 400 watt metal halide floodlights on each pole sufficient to illuminate both GTG's and common areas to 50 lux

2.2.6 Ground Grid

The Contractor will provide the ground grid for the plant as follows:

- Furnish and install plant ground grid expansion with associated ground rods and connections to plant equipment, buildings and fence in accordance with Paragraph 12.2.21 of the EDC specification

2.2.7 Plant Electrical Cable Tray

The Contractor will provide the plant electrical cable tray work as follows:

- Furnish and install galvanized steel cable trays throughout plant. Cable trays to be mounted on pipe racks, cable trenches or within buildings for routing plant cabling. A separate cable tray will be installed for each of the 15/5KV systems, 480V system, and instrumentation system cables

2.2.8 Underground Conduit and Cable Systems

The Contractor will provide the plant underground conduit and cable system as follows:

- Furnish and install rigid galvanized conduit or PVC encased in concrete for all underground power, control and instrumentation systems

2.2.9 Lightning Protection

The Contractor will provide lightning protection as follows:

- Furnish and install lightning protection on each gas turbine exhaust stack.

2.2.10 Batteries / Chargers / UPS Systems

The Contractor will perform the following work on the batteries / chargers / UPS systems:

- Furnish and install BOP UPS system for remote DCS PLC and associated equipment
- Furnish and install one (1) 125V DC battery and charger for 13.8KV plant switchgear

Note: 24 VDC batteries and chargers are to be supplied as part of the GE LM 6000 package

2.3 Plant Instrument and Control Systems

2.3.1 BOP Control System

The Contractor will furnish and install a BOP control system consisting of:

- One (1) DCS PLC system expansion and HMI's to be located in the main control room
- Provide and install remote PLC panels as required in certain areas of the site and interfaced back to the main control room DCS
- Two (2) GE package supplied HMI's to interface with DCS System
- Contractor will transfer software licenses to the Owner at the completion of the project. This will include the license documentation passwords and keys. It will be the responsibility of the owner to maintain these licensing articles for the time when the software needs to be reinstalled
- The Contractor supplied DCS shall allow for system expansion through the addition of controllers, operator stations in the control panels, process I/O systems and / or process controllers while the equipment associated with the controller/computer are in manual mode. Modifications can be preformed while the Power Plant is operational and the equipment in question is in manual mode. Proper safety precautions must be adhered to. "Tag out" procedures may be required.

- Operator stations in the control room can be expanded while in remote mode and the Power Plant is operational.
- Various vendor supplied PLCs for the major equipment will use either function block or ladder logic programming. The Balance of Plant PLC will use ladder logic programming.
- Gas detectors to be located in plant area per applicable codes and standards. (Natural Gas supply is not odorized).

2.3.2 Plant Instrumentation Devices

- Gas Turbine Control Panel is supplied with each LM6000 gas turbine mounted in Control Module supplied by GE
- Contractor to furnish and install instrument devices, both pneumatic and electric, consisting of meters, pressure, flow, temperature and level where required

2.3.3 Electronic Wiring and Pneumatic Piping

- Contractor to furnish and install necessary instrument wiring and pneumatic piping with associated Swagelok fittings, etc.

2.4 230 KV Substation – Not Included: Contractors Scope stops at 13.8KV side of GSU Transformer.

2.4.1 Generator Step-up Transformers (GSUs)

- Contractor to install two (2) each Owner Supplied 60 MVA generator step-up transformers with 13.8KV delta to 230 KV wye windings

2.4.2 Protective Relaying

- Contractor to supply and install protective relaying for the GSU transformers and provide interface points for other substation protective relay equipment provided by Owner

2.4.3 Site Work

- Contractor to prepare the site and provide the following:
 - Foundations for the GTGs, fuel and water tank area, GSU transformers, buildings, truck off-load and gas compressor
 - Driveways and roads
 - Gravel

2.5 Plant Communication System

- Contractor to provide communication and public address system for the new plant in accordance with 16.10 & 17 of the terminos de referencia.
- Contractor to furnish temporary telephones and email capability for construction communication purposes.
- Permanent telephone lines for operation of the plant will be provided by Owner.

2.6 Plant Civil and Structural

- Site preparation, rough grading, and finished grading to be furnished by Contractor based on an existing site requiring minimal cut and fill.
- Contractor to furnish and install all plant reinforced concrete foundations designed to IBC 2003. GSU foundation shall have 9" freeboard.
- Contractor to furnish and install concrete containment curbs and equipment foundations, including liquid fuel offloading area.
- Contractor to furnish and install plant gravel and asphalt paving as shown on the Plot Plans.
- Contractor to provide structural steel pipe racks to support overhead piping and cable trays. Pipe racks to be located as shown on Plot Plan drawings.

2.7 Plant Buildings

Contractor to furnish and install:

- Demin Water Treatment Building expansion
- Gas Compressor Shed expansion
- Electrical / Control Building with pump shed

2.8 Plant Equipment Erection

- Contractor to unload all Plant equipment delivered to site.
- Contractor will provide all cranes and support equipment and manpower as required to erect the gas turbine generators.
- Contractor to provide for erection of all BOP equipment.

2.9 Cranes, Equipment and Tools

Contractor to furnish or provide for all plant construction required cranes, fork lifts, back hoes, hydraulic lifts, welding machines, air compressors, generators, temporary lights, trucks, pick-ups, etc.

2.10 Transportation

Contractor will provide Owner with a proposal for the transportation of equipment to site.

2.11 Lubricants and Chemicals

- Contractor will supply and install all lubricants, lube oils and chemicals for furnished equipment.
- Contractor to supply and install non-PCB oil for GSU transformers.

2.12 Spares

- Contractor will make provision to supply, receive and store all commissioning spare parts furnished for equipment during start-up and commissioning.
- Contractor to provide Owner with recommended list of spare parts for the BOP equipment supplied by Contractor.

2.13 Construction Offices and Storage Facilities

- Contractor to provide construction offices for Contractor, Technical Representatives (3), and Owner.
- Owner is providing the site which has sufficient lay down area and site for construction offices and construction utilities (electrical and potable water)
- Contractor to provide fenced storage and a lay down area and around the construction site during construction.
- Contractor to provide sanitation facilities for Contractor, & Owner personnel during construction.
- Contractor to provide communication facilities for construction.

2.14 Engineering and Project Management

- Contractor to provide detailed engineering and specifications for all disciplines involved for the power plant including civil and concrete foundations.
- Contractor to provide project management complete with construction management, quality control / quality assurance, scheduling, administration, warehousing, and expediting including regular monthly reporting of all disciplines.
- Contractor to arrange for and provide fully qualified technical representatives during erection, testing, start-up, commissioning for the gas turbine generator units and Chillers.
- Contractor to provide startup, commissioning and testing of BOP associated systems.

- Contractor to provide operator and maintenance training for Power Plant on the Gas Turbine Generator Packages and Balance of Plant.
- Contractor to provide one (1) electronic and two (2) hard copies in English and Spanish of the O&M manuals, training manuals, engineering calculations, commissioning and start-up manuals, test manuals, as-built drawings, design specifications and warranty manuals for plant equipment.

2.15 Cathodic Protection

Cathodic Protection will be provided for all steel underground piping.

Section 3.0 Balance of Plant Equipment Supply Matrix

Material/Responsibility	Qty	Description
Owner	1 Lot	Removal of all unused building foundations, underground piping, etc. on the proposed project site
	1 Lot	Natural Gas Pipeline and supply metered at inter-tie point within 50' of Plant Boundary
	1 Lot	Fuel Gas for Commissioning / Start-up that meets P&W Fuel Specifications
	1 Lot	Raw Water Supply to site boundary
	1 Lot	Raw Water for Commissioning and Startup
	1 Lot	Waste Water and Waste Oil Truck Removal
	1 Lot	Permits for Environmental, Importation, Transportation, Building, Operations, etc. to allow plant construction and commercial operations
	1 Lot	Construction Commissioning 480V three phase power
	1 Lot	Access Roads to site
	1 Lot	Any required Electric Utility 13,8KV to 230 KV Tie-In interconnect to the Utility
	1 Lot	Import Duties and Taxes
	1 Lot	Construction lay down area as available on the existing site
	1 Lot	Right of Way, easements, etc. to allow proposed interconnects as required
		Gas Turbine Generator
	2	GE Frame LM6000 PC (60Hz) Gas Turbine Generator packages
	2	Turbine Control Panels
	2	Generator Control Panels and Protection Panels - 24 VDC Batteries and Chargers
	2	13.8 KV to 230 KV GSU Transformers , 60MVA
Contractor – ProEnergy EPC Responsibility Civil / Structural	1 Lot	Site Soil Borings & Studies to design Foundations
	1 Lot	Site Preparation, Rough Grading, Excavation, final grading and fencing
	1 Lot	Temporary Power Distribution
	1 Lot	Plant Concrete Foundations
	1 Lot	Plant Paving, Gravel and Pads for the GTG Turbines and Generators
	1 Lot	Structural piping supports, platforms, ladders, and Misc structural steel supports. (Note: Platforms and ladders for the exhaust stacks to be furnished by Owner)
	1 Lot	Erection of the (2) Owner Furnished GE LM 6000 PC Gas Turbine Generators, Exhaust Stacks, Control Modules and associated accessories.
		Buildings
	1	Demin Water Treatment System expansion & Forwarding Pump Building expansion
	1	Gas Compressor shed expansion
	1	Control Room, Electrical building and pump shed
	1	Water Treatment Building expansion
		Mechanical
	2	Exhaust 45' Stacks with Silencers
	1	Fuel Gas Plant expansion ESD Valve
	2	100 % Fuel Gas Compressors
	1	Fire Water System expansion including, Loop, Monitors and Hydrants
	1	Duplex Instrument Air Compressor

Material/Responsibility	Qty	Description
Contractor (continued)		
Mechanical		
	2	GTG Duplex Demin Water Filter Skids
	1	Water Treatment System expansion consisting of Multi-Media filters and R.O. System
	1	Demineralized Water Treatment system (EDI) expansion
	2	Demin Water forwarding Pumps
	1 Lot	Pipe, Valves and Fittings with Insulation as required
	1 Lot	Mechanical Labor
Electrical		
	5	13.8 KV Fused Disconnects (Station Service) NEMA 3R
	1	13.8 KV/4160 V 1500 KVA Fuel Gas Compressor
	4	13.8 KV/480 V 500 KVA Transformers
	1	4160 V MCC for Fuel Gas Compressor
	1	480 V Water MCC
	1	480 V Gas Compressor MCC
	1 Lot	BOP 480/220 V Transformers, Lights, Panels etc
	1	120 V UPS System for Control Room
	1	Plant Grounding Grid
	1 Lot	125 VDC Battery & Charger
	1 Lot	Lightning Protection 50 lux
	1 Lot	Cathodic Protection for underground steel piping
	1 Lot	Area Lighting
	1 Lot	480 V Welding Receptacles
	1 Lot	Electrical Labor
	1 Lot	Local Subcontractor(s) Civil, Electrical & Mechanical Craft Labor
Instrumentation & Control		
	1 Lot	Plant Instrumentation
	1	Remote DCS PLC
	1 Lot	I&C Installation and Construction
Construction		
	1 Lot	Major Equipment Erection
	1 Lot	Mechanical Installation and Construction
	1 Lot	Construction Tools, Rental Equipment & Rental Cranes
	1 Lot	Lubricants, Chemicals, Filters, etc. for Plant Commissioning and Start up
	1 Lot	Balance of Plant Start up and Commissioning Spare Parts
	1 Lot	Transportation of all BOP Equipment to site
	1 Lot	Plant Commissioning and Performance Testing
	1 Lot	Overall Plant Training
Engineering		
	1 Lot	Conceptual and Detail Design engineering (Total Plant)
	1 Lot	Project Manuals including O&M, Warranty, and Engineering Calculations
	1 Lot	As Built Drawings
	1 Lot	Recommended Vendor Spare Parts List



Electricidad de Caracas LaRaisa Power Plant Technical Scope Document

Material/Responsibility	Qty	Description
Contractor (continued)		
Project Management		
	1 Lot	Project Management with QA/QC, Safety, and Training
	1 Lot	Construction Permits
	1 Lot	Local Business Taxes
	1 Lot	Project manuals including project procedures, Systems Turnover Manuals, project implementation, QA/QC, safety and training
	1 Lot	Training of Operators for the LM 6000 GTGs and BOP

Section 4.0 Design Basis and Interconnect Points

4.1 Design Conditions

Design Conditions

Site Elevation (Meters above Mean Sea Level)	283.6
Multi-year median temperature:	24°C
Maximum dry bulb temperature:	33°C (95°F)
Maximum wet bulb temperature:	28.3°C (82.94°F)
Multi-year median relative humidity:	69%
Median annual precipitation:	813mm (32 in)
(Majority during the months of October and November)	
Predominant wind direction:	Northeast
Maximum average multiannual wind velocity:	78km/h
Seismic Zone	4
Fuel Gas Supply Pressure	250 psig minimum
Plant Gas Fuel Consumption Rate (2) LM6000	<u>20.8</u> mmscfd *
High Voltage Interconnect @ GSU Bushings	230KV Substation (By Owner)
Instrument Air System add	185 scfm by Contractor
Demin Water required add	<u>65</u> gpm
Demin Water Storage - existing	1,000 m ³ (275,000 gal)
Raw Water Storage (Includes Fire water) existing	2,400 m ³ (675,000 gal)
Raw Diesel Fuel Storage existing	5,000 m ³ (2 x 675,000 gal)
Clean Diesel Fuel Storage (2) existing	3,000 m ³ (2 x 275,000 gal)

* assumes 900 - 1050 BTU/SCF natural gas quality

4.2 Interconnect Points

Interconnect Points

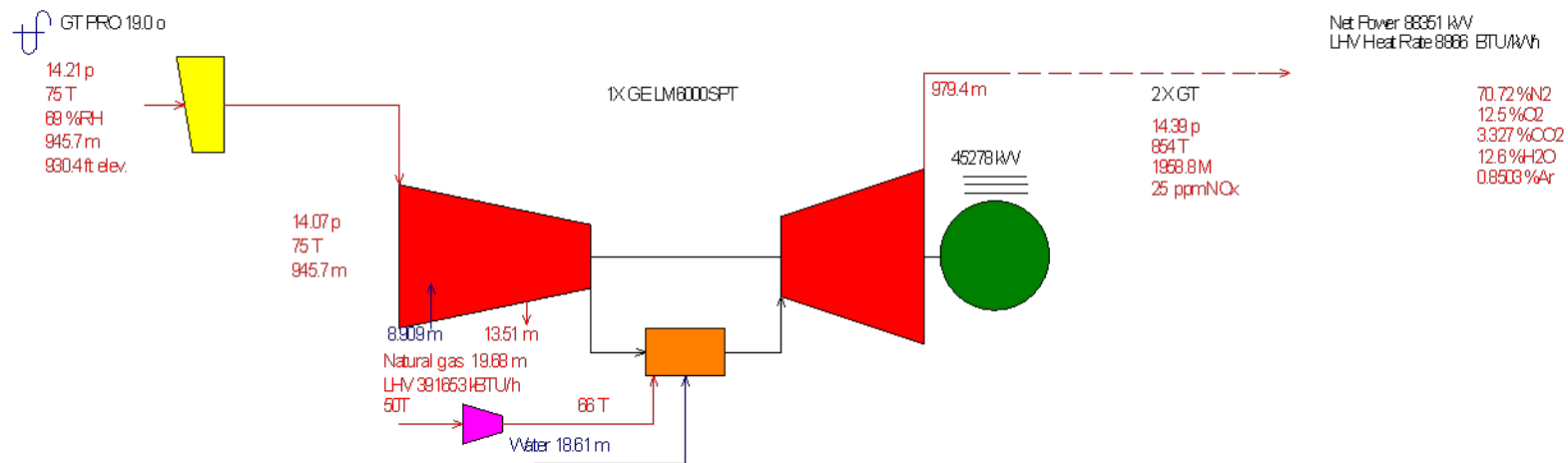
Fuel Gas	250 psig at PDVSA Metering & Regulating Station within Site
Plant Waste Water	At existing waste water tank discharge pump
Plant Waste Oil	At existing waste oil tank discharge pump
230 KV	At GSU High Side Bushings
Raw Water Supply	At existing Raw Water Tank

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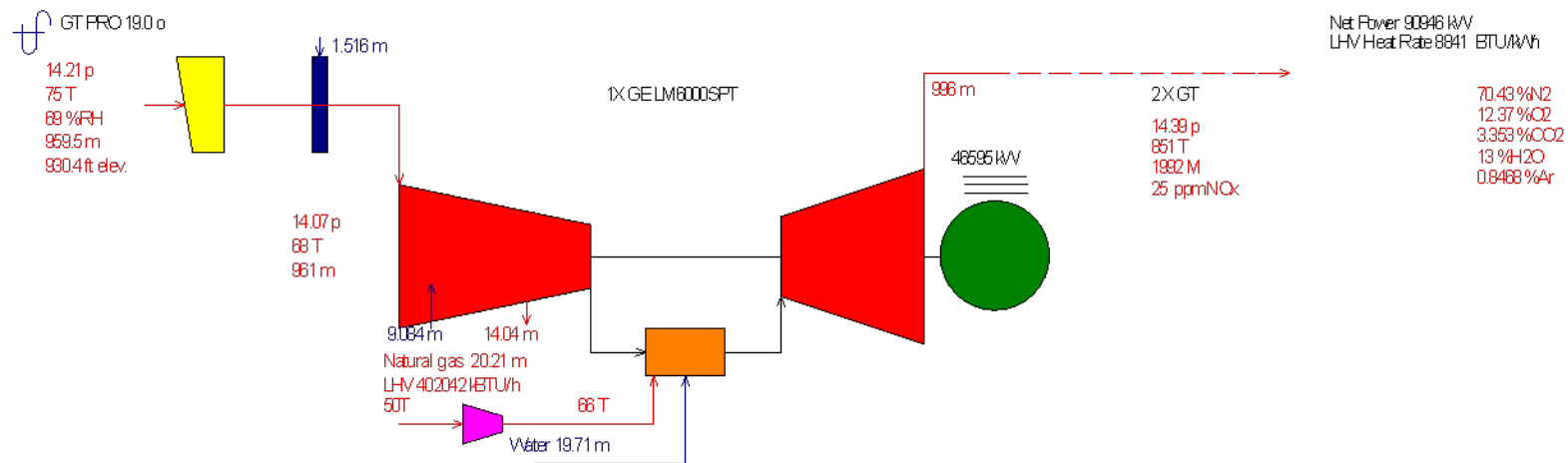
Section 5 Plant Performance and Performance

LaRaisa Phase 2 T9036 07/27/09

MSC: 75.2°F; 69% RH; 930.4 ft		
GE LM6000 PC sprint w/ NOx water injection		
	Natural Gas	Natural Gas
	997 BTU/scf HHV	997 BTU/scf HHV
	(2) Units w/o EvapC	(2) Units w/ 90%eff Evap Cooling
Gross Power (kW)	90556	93191
Net LHV HR (BTU/kWh)	8866	8841
Net HHV HR (BTU/kWh)	9815	9788
Net Power (kW)	88352	90946
Misc. Auxiliaries (kW)	933	939
Fuel Compressors (kW)	819	840
Transformer losses (kW)	453	466
Total Auxiliaries (kW)	2205	2245
Fuel usage (pph)	39366	40410
Fuel usage (MMSCFD)	20.2	20.8
Fuel Chemical HHV/LHV ratio	1.107	1.107
Sprint water (gpm)	17.82	18.17
NOx water injection (gpm)	37.22	39.42
Evap Cooling water (gpm)	0	3.



p[psia], T[F], M[kpph], SteamProperties: Thermflow- STQUIK



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6.0 Plant and Equipment Warranties

Balance of Plant Warranties – Contractor will obtain from all equipment vendors their warranty on the material and equipment provided. These warranties will be for a term of 12 months from commercial operation (full power) date and if a replacement is required, for a term of 12 months following such replacement. The warranty for each component will include replacement of the item as well as the Contract labor cost to replace and install.

This vendor warranty information will be assembled and packaged into a Warranty Manual. The Warranty Manual will provide vendor name and contact information, component description, and model number. The warranty Manual will be provided to the Owner.

Section 7.0 Project Management and Organization

7.1 Project Management Execution

7.1.1 Project Management Team (Typical)

The Contractor will assemble a well qualified and experienced team of individuals who have worked together on many previous projects.

The team will be comprised of:

- Project Manager
- Administration Manager
- Project Technical Consultants
- Construction Manager
- Purchasing / Expediter
- Scheduling
- QA/QC
- Project Engineering Manager
- Site Erection
- Commissioning / Start up Managers
 - Mechanical
 - Electrical
- Mechanical Construction Superintendent
- Electrical Construction Superintendent
- Training

The team as outlined above has worked together on many gas turbine generator power plants within the US as well as internationally. They have successfully completed a number of “Fast Track” projects internationally.

7.1.2 Project Manuals

One of the first tasks to be initiated is the preparation of the project specific project manuals. These manuals are listed:

- Project Procedures
- Project Implementation
- Project Engineering Calculations
- Project Warranties
- QA/QC
- Safety
- Training
- Operation and Maintenance
- Commissioning, Start Up, and Turnover
- Project Performance Tests

7.1.3 Project Schedule

Along with the commencement of preparation of the project manuals, the detailed project schedule will be started. This detailed schedule will be developed utilizing Microsoft Project. The project schedule will be a living document which will be continually updated by a full time assigned scheduler for the life of the project. The proposed project schedule is included in Section 8.0.

7.1.4 Project Engineering

Preliminary conceptual engineering has been developed during the proposal phase which consists of:

- General Arrangement Plot Plan
- Process Flow Diagram
- One Line Diagrams

The conceptual drawings listed above are immediately completed after project Notice to Proceed. This entails updating the various drawings based on final agreed upon items with the Owner and/or Owner's Engineer. The Process Flow Diagram is completed with the latest heat and material balance. The One Line Diagrams are further developed to reflect loads, breaker / fuse sizing, DL power, etc. The Control System Drawing is likewise further completed reflecting agreed upon HMI's, printers, Balance of Plant Equipment PLC's, etc.

The conceptual engineering is completed utilizing the project technical consultants (responsible for proposal preparation) and the detailed engineering team to guarantee a smooth hand over to the detailed engineering phase.

During the conceptual engineering phase, specifications are finalized for all engineered equipment to be purchased. On a "Fast Track" project most of the engineered equipment has been preliminarily specified with only final checks and agreed upon modifications made.

Detailed engineering will be completed utilizing the conceptual drawings previously described and with Owner approval. This detailed engineering will include: engineering protocol for drawings and specification.

As-built drawings will be completed upon completion of the installation phase of the project.

7.1.5 Owner Approval

It is proposed that three approval steps be in place for the engineering phase of the project. These steps would be 30%, 60%, and 90%. The Owner or Owner's Representative could travel to the Contractor or vice versa at the Owner's request.

7.1.6 Project Procurement

Major engineered equipment which has been specified during the proposal and configuration phases of the project are submitted on the agreed upon approval process and when approved will be purchased.

The Balance of Plant Equipment and materials (normally short delivery) will be itemized and listed during detailed engineering. A decision will be made as to who will furnish (Contractor or Subcontractor) based on job conditions, locations, etc.

7.1.7 Construction Phase On Site

The project management team will move to the site for the construction phase of the project. This phase is further described as follows:

1. Mobilization

A mobilization and construction lay down plan will have been prepared as part of the Project Implementation Manual. This would include setting up the normal required items.

- Construction offices
- Site utilities
- Secure and non-secure lay down areas
- Communications
- Project management housing, transportation, food, etc.
- Arrangements for major equipment rental
- Surveys, soil tests, etc.

2. Project Construction

Project construction will be carried out utilizing local subcontractors and materials where feasible. Contractor will furnish construction management and detailed supervision of all disciplines.

3. Commissioning and Turnover

Commissioning and Turnover Manuals will be prepared for each discrete system making up the power plant. An experienced and knowledgeable commissioning and turnover team will be assigned under the supervision of a well qualified start-up manager. This team will commission on a "priority system" basis the various systems to provide for plant start up. It is desired that plant operation and maintenance personnel be involved to provide valuable hands on experience.

4. Training

Operation and maintenance training will be conducted in two phases:

- General Electric LM 6000 GTG equipment classroom at the site subject to plant operator preference.
- On site balance of plant operation and maintenance.

Formal training manuals will be prepared with formal on site training to be conducted.

5. Plant and Performance Testing

Plant and performance test documents will be prepared and submitted for approval. The formal tests will be conducted on an agreed time with the necessary Owner's Representatives attending.

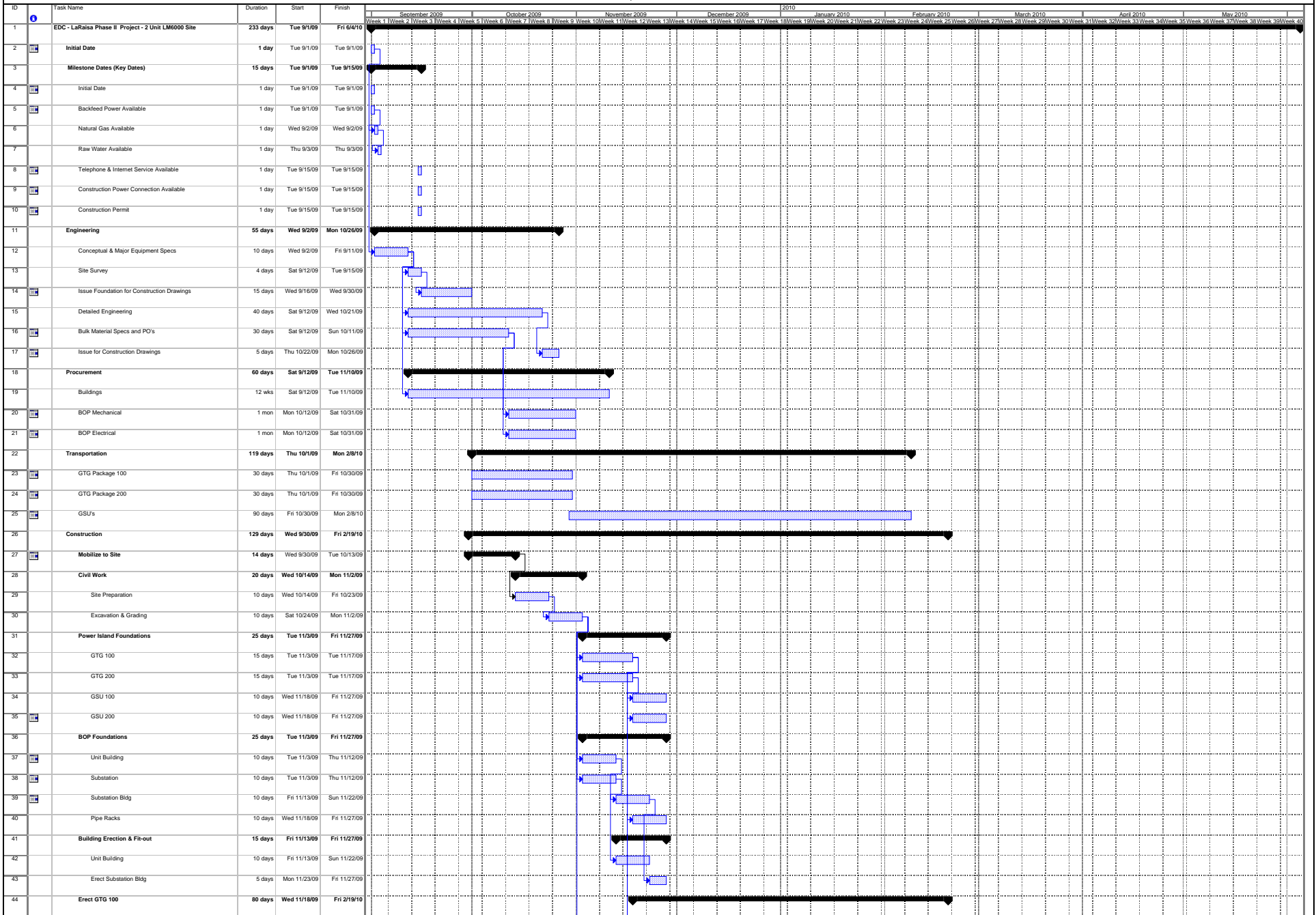


Electricidad de Caracas LaRaisa Power Plant Technical Scope Document

8.0 PROJECT SCHEDULE

Please find on the following pages ProEnergy EPC Services' Typical Project Schedule for the installation of (2) Two LM6000 PC Gas Turbine Generators.

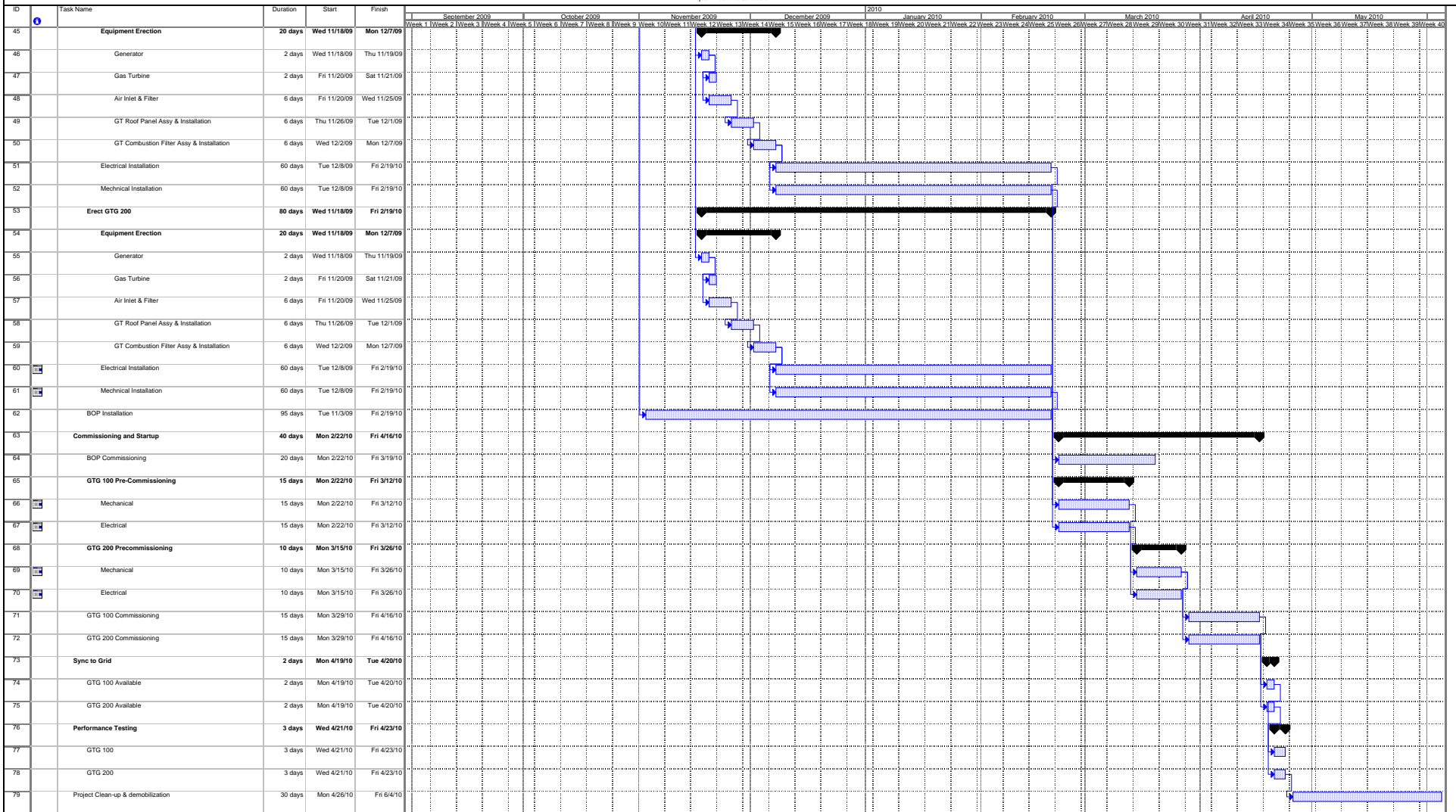
EDC LaRaisa Addition Project
LM6000 Simple Cycle Project
Project Executive Schedule



Project: EDC LaRaisa Addition LM6000
Date: Mon 7/27/09

Task  Split  Progress  Milestone  Summary  Project Summary  External Tasks  External Milestone  Deadline 

EDC LaRaisa Addition Project
LM6000 Simple Cycle Project
Project Executive Schedule



Section 9.0 PROJECT QA/QC PLAN

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PART 1 PROJECT QA/QC PLAN

I. INTRODUCTION

Our employees have over 40 years of history with EPC projects for the Power Generation industry. As a turnkey engineering and construction contractor, we have followed stringent quality guidelines throughout its history. The QA/QC Controls in place have been developed and fine tuned over these multiple and varied project experiences. The QA/QC plan that exists today is based upon experience in interpretation and application of codes and standards as well as practical knowledge learned in expeditiously bringing a project to successful completion.

The following sections will provide a detailed description of the Corporate Policy regarding Quality Assurance/Quality Control and a Project Specific Plan for the Quality Assurance/Quality Control management of the Power Project.

II. ORGANIZATION

The Quality Assurance Manager acts as the point-of-contact for any non-conformance reports and initiates corrective action as required. He/she ensures that required inspections, tests, evaluations, reviews, audits and all other quality control measures are performed as necessary to strictly adhere to the corporate-approved Quality Control and Assurance program plan. The Quality Assurance Manager is assisted by a team of inspectors who conduct all manners of inspections and tests required, ensuring that the installed system conforms to the approved drawings and specifications.

An organization chart is furnished which shows the organization of the Quality Control and Assurance Team by position, title and name. All quality control team personnel will be assigned based upon individual and collective expertise as related to the specific areas of quality control necessary to support the contract work effort.

III. PLAN TASKS AND PROCEDURES

A. Construction Design

1. Design Documentation Review - Drawings

Project Engineers are responsible for conceptualizing and engineering the project. To ensure that the design meets all requirements, inspections will be conducted throughout the design process. Prior to issuance of "Issue For Construction" package, all drawings will have the following signatures and dates.

Draftsman	Signature and Date in Drawn By Block
Checker	Signature and Date in Check Block
Project Engineer	Signature and Date in Design Block
Project Manager	Signature and Date in Project Manager Block
QA Manager	Signature and Date in QA Block

The Project Engineer responsible for the drawing design will initial his approval on all completed drawings. Fundamental configuration drawings (i.e., PFD, P&ID, Electrical One-lines, and Control Configuration drawings) will undergo peer review. Selection of the peer reviewer will be made jointly by the Senior Engineering Manager and the QA/QC Manager. The Quality Assurance Manager will check the drawing for all necessary signatures and initials and will then sign his name and date. The Drawing Review Sheet will be filed by the Quality Assurance Manager as a permanent project record.

Changes to approved drawings require the same review process. Changed drawings will be issued as revisions and will be labeled as such.

2. Design Documentation Review - Specifications

A specification will be generated for each major piece of equipment to be purchased for this project. The Project Engineer responsible for the generation of each specification will initial the completed specification. Prior to each specification's attachment to a Request for Bid or a Purchase Requisition, this specification will undergo peer review by the Project Manager and the Engineering Manager. The Specification will then be passed to the QA/QC Manager for his review and will become a permanent part of the project record.

3. Drawing Control

A Master Drawing Index of all drawings will be maintained. The index will be updated as drawing changes occur and will reflect the current status of each drawing. Only the latest applicable drawings, specifications, instructions and authorized changes thereto, will be issued for manufacturing, construction, inspection and testing. Reproducible copies or computer disk files of final revision levels of a drawing will be maintained for record.

B. Subcontracted Design

The same approval and quality assurance procedures to which own design work is subjected will also be applied to all design work subcontracted to an outside source. Drawings and other design documents will be reviewed and examined for compliance with both the technical and format requirements of the contract specifications.

C. Material Procurement

Responsibility for procurement of various equipment and supplies will be clearly defined prior to the initiation of any procurement. Purchasing Manager and staff will directly monitor all procurement efforts of major equipment under their immediate control.

Balance of Plant purchasing, i.e., Buildings, Mechanical, Electrical (conduit, fittings and wire), and Area Lighting will be the primary responsibility of the various subcontractors. Some of the project tasks will be purchased as a sub-system or system from different vendors or subcontractors. In order to ensure adherence to the project schedule, will direct scheduling and expediting of materials and equipment purchased by subcontractors.

1. Procurement Procedures

Procurement Procedures are published in the Corporate Project Procedures Manual. The following sections detail Procurement Procedures for this project. We implements these controls for every large project to ensure that the client receives the best value in materials and equipment as well as a quality installation effort.

1.1 Prequalification of Manufacturers / Vendors / Construction Contractors

Select Manufacturers / Vendors / Construction Contractors based on our own Qualified Vendors List (QVL). The stated purpose of the QVL is to ensure the best value and the highest quality in workmanship, materials and equipment for and our clients. Each manufacturer / vendor / contractor listed on the QVL has been evaluated based on past performance using the following criteria:

- Proper documentation of and compliance with inspection/test requirements
- Quality of workmanship
- Efficient handling of Purchase Orders
- Adherence to shipping schedules
- Prompt resolution of non-conforming material problems
- Compliance in manufacture and supply with specifications
- Warranty Work
- Product or Product Lines
- QA/QC audit (if necessary)
- Price

New vendors / contractors with no previous history are evaluated based upon the following:

- Product Lines
- Project Histories for similar projects

- Discussion with former Client Contacts
- Financial Stability
- Staff Qualifications
- Capability to complete the project
- Financial Stability
- QA/QC Audit (Manufacturers / fabricators if necessary)
- Client List

1.2 Material / Equipment / Parts / Services Selection

This section provides an overview of methodology in selecting materials, equipment, parts and services. Expediting procedures are included to ensure that the project schedule is not impacted by shipping delays.

The established twelve main stages in the procurement of materials, equipment, parts and services:

- Preparation of the Specifications for equipment and materials
- Identification of each item and preparation of purchase requisitions
- Issuing the Request for Quotation
- Quotation Review, Negotiations and selection of vendor or contractor
- Preparation and Placement of the Purchase Order
- Scheduling delivery of the Purchase Order
- Expediting the Purchase Order
- Receipt of Materials/Equipment/Parts and Inspection of same
- Inspection of Contracted Services and Approval of Same
- Resolution of any Non Conforming Material problems as well as any Corrective Action Items
- Field Purchase Orders

2. Equipment / Material Specification Preparation

Procurement specifications originate in the Engineering Department. The Engineering Manager will task staff engineers with the generation of specifications. The Engineering Manager and the Project Manager will review the equipment specification for compliance with applicable codes/standards and contract specifications. If Client approval is required, the Project Manager will forward specification to Client, obtain approval signatures, and then return the approved specifications to the Engineering Manager.

Standard Specifications are divided into two (2) classes, “short form” and “book type.” Short form specifications are used whenever good engineering practice and contractual arrangements permit. They are simple and flexible. “Book type” specifications are more formal, more expensive, and may be used on major engineered items of equipment, usually at the request of the Client.

2.1 Purchase Requisitions

Purchase Requisitions will originate with engineering. The Purchase Requisition will be approved by the Project Manager or Engineering Manager prior to submittal to the Purchasing Department. The Requisition will be checked by either the Engineering Manager or the QA/QC Manager for compliance to specifications. The Purchase Requisition will then be forwarded to the Purchasing Manager. The Purchasing Manager will direct that the Request for Quotation (RFQ) be developed and sent to approved suppliers on QVL. The specifications developed by Engineering will be attached to the RFQ.

The vendor or subcontractor shall be given sufficient time to prepare their bid for equipment or services. The time frame for bidder response shall be so stated on the RFQ.

2.2 Quotation Reviews

Each quotation will be reviewed prior to the issue of a Purchase Order. Major Equipment, Material, and Contracted Services purchases will be reviewed by a representative from the applicable engineering discipline and project management.

2.3 Purchase Order

Following evaluation of quotations and completion of negotiations, an award will be made. The Purchasing Manager will generate the Purchase Order.

Purchase Orders include the following:

- Detailed description of products and services
- Required delivery date
- Test and Inspection requirements, if applicable
- Terms of payment
- Shipping information and point of contact
- Required documentation

A Purchase Order Log will be maintained at all times. Purchase Progress Reports will be updated weekly.

2.3.1 Expediting the Purchase Order

Purchasing Manager will delegate an expeditor to track delivery of major equipment and materials for the project. The expeditor will closely monitor the progress in fabricating or gathering of materials from each vendor of equipment and materials which could impact the project schedule.

2.3.2 Closing out of Purchase Orders

Documented receipt of equipment / materials in good order will be forwarded to the Administrative Manager and the Purchasing Manager. Contracted services will be inspected and signed off upon satisfactory completion. At this time, the Administrative Manager will sign these documents and direct the Purchasing Manager to forward same to Accounting for payment. Payment will be by terms agreed to on Purchase Order.

2.3.3 Field Purchase Orders

Field Purchase Orders will require approval from Purchasing Manager. Field Purchase Orders will be documented, and a written Field Purchase Order Log will be maintained.

2.4 Material / Equipment Receiving Inspection

Receiving Inspections will be performed on all major equipment / material for the project. QA/QC project staff will perform the inspection. Methodology is discussed in detail in the project QA/QC Section of this document.

All materials requiring Material Certifications and/or Material Test Reports (MTRs) will be checked for compliance to project specifications. Materials received without the proper certifications will be tagged and segregated until such required documentation is received.

2.4.1 Hazardous Materials Storage

All coating materials, lubricants, flammable solvents, and other items identified by the Project Manager or the Owner as falling under Hazardous Material designation will be segregated from other project materials and equipment. These items will be stored in a secure location. All MSDS sheets will be posted in this area concerning each type Hazardous Material. An inventory will be maintained detailing receipt and issuance of any said material to installation staff and/or subcontractor.

If a subcontractor will directly receive or bring upon jobsite any materials in this category, they will be directed to comply with the established HAZMAT storage materials plan. This plan will be issued as a separate document and will be available at site for all personnel to review.

2.5 Corrective Action / Non-Conforming Equipment / Materials

All equipment / materials which do not reflect compliance to project specifications, shipped without MTRs, damaged in shipment, etc. will be tagged and segregated until such time as vendors resolve the problem. Methodology for these processes is discussed in detail in the QA/QC section of this document.

D. Test Plans

Test plans will be developed for testing each segment of the project both independently and collectively. Test plans will explain the purpose of the tests, define inputs, specify procedures, and acceptance criteria.

1. Measurement and Test Equipment

Measurement and test equipment used for inspection and acceptance testing shall be calibrated at established intervals against certified standards. All subcontractor and vendor test equipment used for vendor acceptance testing in connection with this contract shall meet the same calibration requirements.

2. Documentation

Inspection and testing documentation will be prepared in clear language. Test procedures will define all conditions and materials required for the test, specify test equipment and provide pass/fail criteria.

Reports will be prepared to document the results of each inspection and test performed. The records will identify the test equipment used, the observations made, the deficiencies found and the corrective actions taken.

3. Definition of Test Types

- a. Factory Tests are defined as tests performed at the location where the item is produced, fabricated, manufactured or assembled prior to shipment to the site.
- b. Field Verification Tests or Pre-Operational Tests are tests performed after installation. These tests verify that components and subsystems are installed and perform correctly.
- c. The Operational Systems Test is a comprehensive test of the installed system. The results of this test determine acceptance or rejection of the system.
- d. Performance tests are a series of tests to verify project-mandated performance guarantees.

E. Corrective Action

When problems or deficiencies are discovered in workmanship and/or materials during the inspection process, they will be documented. The inspector will prepare a Corrective Action Request (CAR) detailing the problem and submit it for resolution. The QA Inspector will forward the CAR to the QA Manager and the Project Manager. Corporate

Project Management will investigate the problem and direct the proper course of action. All Corrective Action Requests shall be maintained for future reference or analysis as may be required.

IV. INSPECTION REQUIREMENTS

A. Responsibilities

Perform the inspections and/or tests required to substantiate that the materials and services conform to requirements. The Client may witness any of the inspections or tests. All errors and/or defects discovered during inspections and/or tests shall be documented.

B. Classification of Test

Test Classifications include factory testing of components and major subsystems, field testing, and on-site final acceptance testing of the complete system. Some of the individual component and subsystem testing may be performed concurrently with the Operational Test. Construction Inspections will be performed during the installation work.

1. Factory Testing

Factory testing will be accomplished as required to ensure compliance with the contract specifications. Prior to shipment from the factory, some components and/or subsystems may be tested to demonstrate their compliance with the specifications. These items shall be identified and noted on the purchase order.

2. Operational System Test (OST)

A test of the entire System in full operational mode will be conducted to verify correct operation of all subsystems and system components. All functional capabilities of the system will be demonstrated. Following completion of the test, we will prepare and submit a test report.

These test procedures will be developed during the project construction phase and will be delivered to the client for approval prior to Operational Testing efforts being undertaken.

C. Test Documentation

The Quality Assurance Manager will ensure that test procedures and test reports are prepared as outlined herein. Test documentation will be issued to the client. Test procedures will be developed for testing components, subsystems and the overall system. Testing shall demonstrate that the system design meets the requirements and that materials and workmanship are as specified. Test results shall be recorded and bound with the test procedures to form a permanent record.

V. PROJECT SPECIFIC INSPECTIONS AND TESTS

The project warrants a wide variety of inspections and tests. The following sections briefly describe the project inspection and test requirements by function and/or discipline.

A. Site Preparation

- Confirmation of site dimensions.
- Confirmation of topographical elevations on completion of final grading. Assumes existing elevation is within two (2) feet of final grading level.
- Confirmation of Water Run Off Control after Final Grading is achieved
- Review of complete soil compaction and associated tests.

B. Ground Grid

- Confirm grid installed at correct depth and dimension with correct materials.
- Observe and confirm that junctions, splices, and taps are made with the correct Thermic weld type molds or pressure connectors and tools.
- Observe and confirm that correct wire and size are used with regard to ground rods.
- Perform ground grid resistance test.

C. Concrete Foundations, Walls and Slabs

- Confirmation of correct locations and dimensions of concrete foundation and wall forms.
- Confirmation of correct size and spacing of rebar in concrete foundations.
- Confirmation of proper anchor bolt sizes and location.
- Verify procurement of correct concrete strength.
- Witness the taking of necessary concrete samples for "slump" and "strength tests."
- Obtain qualified testing lab for concrete strength tests.
- Confirm proper correct elevations and slope of all slabs, walls, etc.
- Document above items on concrete pour card.

D. Electrical

- Confirm the receipt of each major item of electrical equipment. Verify specification compliance and inspect for transit damage.
- Confirm that receipt of all equipment and miscellaneous materials - conduits, cabling, etc., adhere to procurement requirements.
- After wiring is pulled and prior to connection, the wire will be Megger tested and all test results will be recorded on a Megger / Hi-Pot Test Record Form.
- Observe all conduits routing to ensure adequate turning radius for cable pulling.

- Perform detailed point-to-point wiring checks to verify power, control, and instrument wiring.
- Perform pre-operational tests on all electrical equipment and systems.
- Confirm tagging and labeling, verify and document as-built drawings.

E. Structural Steel

- Confirm correct size and type of structural steel.
- Confirm proper installation of anchor bolts, washers, and nuts installed, as required.
- Verify that qualified welders perform welding in accordance with applicable codes.
- Visually inspect all field welds to confirm they are complete and adequate.
- Verify paint and corrosion protection.

F. Piping and Welding

- Confirm correct size, rating, etc., of each piping system as applicable.
- Verify that qualified welders are utilized. Inspect piping fit up to ensure proper workmanship is utilized.
- Obtain qualified testing lab for welding radiography.
- Set up welding inspection and test procedures in accordance with applicable codes and standards.
- Set up a detailed welding documentation system to address individual pipe code, each weld, x-ray, welder, welding map, date, and inspector review.
- Establish a pipe cleaning procedure.
- Witness hydrostatic testing and test procedures, as required by various codes for each piping system.

G. Instrumentation

- Confirm all instrumentation and control equipment adheres to procurement requirements.
- Confirm instrumentation specification compliance, and inspect for transit damage.
- Observe individual calibration of each instrument, confirming range, accuracy, etc. in accordance with specifications and applicable codes.
- Perform functional loop checks and document same.

H. Documentation

Test and Inspection Documentation will be maintained on site throughout the project construction, commissioning and startup phase. The client will be allowed access to this data at any time.

Following Completion of Startup and Commissioning, the full battery of project Testing and Inspection Documentation will be delivered to the Client.

VI. SHIPPING AND HANDLING

Procedures for shipping and handling of materials will ensure that all shipments meet the requirements for identification, packing, packaging and data submittal. Contractor will be responsible for packing, shipping, receiving and installing the component parts and subsystems that comprise the complete system. The degree of protection and method of handling will be consistent with the anticipated hazards.

Contractor will ensure that the appropriate shipping and handling procedures will be followed. Should damage occur in transit, it will be repaired or replaced as appropriate.

PART 2 PROJECT SPECIFIC TEST AND INSPECTION PROCEDURES

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- XII. REPORTS

PART 2 PROJECT SPECIFIC TEST AND INSPECTION PROCEDURES

I. SCOPE

The following civil, mechanical and electrical test and inspection requirements have been developed for the project.

The civil, mechanical and electrical tasks on this project shall comply with the standards set forth in this document to ensure both the safety and quality of the installation. This document stipulates the inspections and tests that will be performed on the project.

II. STANDARDS AND CODES

The following organization's standards and codes are applicable to design and construction practices for the project.

ANSI B31.3	Plant Piping
ASME IX	Welder Qualifications
AWS A3/0	Definitions of Welding Terminology
AWS B2.1-84	Standard for Welding Procedure and Performance Qualification
AWS D1.1	AWS Code for Structural Welding
AISC	American Institute of Steel Construction – Various sections
ASTM	American Society for Testing Materials – Various Sections
ASME	American Society for Mechanical Engineers – Various Sections
ISA S5.1	Instrumentation Symbols and Identification
NACE RP018890	Standard Recommended Practice: Discontinuity (Holiday) Testing of Protective Coatings
NEMA AB1	Molded Case Circuit Breakers
NEMA ICS1	General Standards for Industrial Control and Systems
NEMA ICS2	Industrial Control Devices, Control and Systems
NEMA ICS4	Terminal Blocks for Industrial Use
NEMA ICS6	Enclosures for Industrial Controls and Systems
MG1	Motors and Generators
PE5	Constant-Potential-Type Electric Utility (Semi-Conductor Static Converter) Battery Chargers
SG2	High Voltage Fuses
WC2	Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
NFPA70	National Electric Code
NFPA No. 1	Carbon Dioxide Extinguishing Systems
NFPA No. 37	Stationary Combustion Engines and Gas Turbines
OSHA CFR Title 29	Occupational Safety and Health Administration
(Note: Codes and Standards may also include Codes and Standards issued by other organizations as directed by Owner.)	

III. TESTS / INSPECTIONS - CIVIL

Inspections will be undertaken throughout the civil portion of the project. The site dimensions will be confirmed. Topographical elevations will be confirmed following grading. All concrete slab and wall dimensions will be confirmed prior to concrete pouring. All concrete will be confirmed to be compliant with design specifications. A qualified third party inspection agency will be retained to conduct slump tests prior to and during concrete pours. All concrete will be strength-tested intervals per ASTM standards. Grouting of mechanical equipment skids will be performed per the developed specifications.

IV. TESTS / INSPECTIONS - GROUND GRID

The ground grid will be inspected throughout installation to ensure that materials used are per design specifications and that installation splices, junctions, and taps are made properly. Depth and dimensional boundaries will be measured and recorded. At the conclusion of installation, the grounding grid will be tested using a test instrument specifically for the task to confirm acceptable impedance levels.

V. TESTS / INSPECTIONS - MECHANICAL

Several elements of the project will require welding during fabrication and installation. These elements include:

- Structural Steel
- Fuel System - Natural Gas Fuel System Piping
- Fuel System - Liquid Fuel System Storage Tank and Piping
- Process Water Systems
 - Raw Water System Storage Tank and Piping
 - Waste Water System Piping
 - Firewater System Piping (HDPE piping Thermal Welding Inspections)
- Oily Waste System
- Lube Oil System

The welding inspection criteria for each of these tasks will be based upon the applicable codes and standards. The following paragraphs briefly describe each task and stipulate the specific code and/or standard(s) that apply.

A. Structural Steel

The structural steel aspects of the project will consist of the building related structural steel and various supports of racks. Design and erection of these assemblies shall be in accordance with the latest edition of the AISC. All welding will be visually inspected per AWS applicable codes and standards.

B. Welding Inspections/Tests

All welders are required to have current certification of their qualifications. Current certifications should indicate the welder has been tested to the project welding procedures within one year prior to welding on project piping.

All visual-welding inspections will be performed by persons who have current certification from AWS or ASNT-TC-1A. All NDE will be performed and approved by persons holding current ASNT-TC-1A Level II certification for the specific test processes implemented. All visual welding inspections will be performed based on the criteria established in ANSI B31.1 and AWS D1.1.

Radiographic Testing (RT) where necessary will be performed in accordance with standards established by ASME Boiler and Pressure Vessel Code, Article 2, Section V, except as stipulated in the applicable code, ANSI B31.3 (Pipe welding inside Plant Battery Limits).

All radiographs of full penetration welds must be accepted by a certified Level II inspector with current certification under ASNT-TC-1A. Accept/Reject criteria for all welds shall be in accordance with criteria established as well as applicable codes. Any rejections will require two (2) weld penalty shots on that welder. If in the judgment of the Site QA/QC Manager that a welder or welders have excessive rejections; may demand the welder be removed from the project or certified to weld on only non critical piping.

C. Natural Gas Piping

Piping from the supply source to the Fuel Filter/Separators will be Carbon Steel. The piping on the downstream side of the filter/separators to the will change to Stainless Steel piping. All Natural Gas piping will be designed and constructed to ANSI B31.3.

A total of 100% of the pipeline welds (100% of each weld) will be subjected to Radiographic Testing (RT).

All radiographs of full penetration welds must be approved and accepted per criteria established in Section B above.

D. Liquid Fuel System

All piping systems will be visually inspected by Craft Inspectors qualified to visually inspect these systems. 10% carbon steel piping welds will undergo RT, 100% of the weld. RTs will be examined and approved by a Level II or III ANSTC-1A qualified technician.

PE or RTR lines will undergo hydro or pneumatic testing. If Hydrotest is used, water as the test medium hydro will be 1.5 times design pressure up to a maximum of 150 PSI. If a pneumatic test is decided upon, the test pressure will be 1.2 times design pressure.

E. Lube Oil System

The Lube Oil system consists of a skid and interconnecting stainless steel piping to the Gas Turbine Package. All interconnecting pipe welds shall be in accordance with ANSI B31.3. All Lube Oil system welds will undergo visual inspection or testing in accordance with ANSI B31.3. Ten percent (10%) of these welds will undergo RT testing (100% of the weld)

F. Hydraulic System

The Hydraulic System consists of a skid and interconnecting stainless steel piping to the Gas Turbine Package. All interconnecting pipe welds shall be in accordance with ANSI B31.3. All Hydraulic system welds will undergo visual inspection or testing in accordance with ANSI B31.3. Ten percent (10%) of these welds will undergo RT testing (100% of the weld)

All radiographs of full penetration welds must be approved and accepted per criteria established in Section B above.

G. Raw Water System

The Raw Water System consists of Carbon Steel Piping.

Raw Water System piping welds will be visually inspected.

H. Process Water Systems

All welded steel piping will be visually inspected as welds are completed. All PVC piping joints will be inspected as they are made up. The Process water systems will be inspected prior to startup. All pumps will be balanced. Remaining components will be inspected and confirmed that they are supplied and installed per specifications.

J. Pump Testing

All pumps supplied will be balanced and confirmed as fully operational prior to startup.

VI. WELDER QUALIFICATIONS

Welders qualified according to the appropriate codes shall make all welds on the project:

- | | |
|-----------------------------------|---------------|
| • Structural Steel | AWS CODE D1.1 |
| • Fuel System Piping | ANSI B31.3 |
| • Lube Oil System Piping | ANSI B31.3 |
| • Hydraulic Startup System Piping | ANSI B31.3 |

All welders will be required to provide certification of their qualification to the appropriate standard. Each welder's certified qualifications will be reviewed and approved by the welding

inspector prior to the welder's beginning work on the project. Applicable welding procedure specifications (WPS) and Procedure Qualification Reports (PQRs) will be required. All reports and certifications will be in accordance with ASME Section IX Article II.

VII. AREA DESIGNATION

Areas where combustible fluids, gases or vapors might be present shall be classified as hazardous areas or hot areas. Guidelines for welding in these areas will be drawn from ANSI Z49.1. Areas designated as safe areas will be those areas on site remote from hazardous areas and where no contact with combustible fluids, gases and vapors are present. Welding in these safe areas, as well as on-site welding fabrication, will be subject to the same standards and codes listed in the previous paragraphs. The welding inspector shall designate an area classification for the project.

IX. SUB-SYSTEMS MECHANICAL TESTS

The test requirements for the various tasks on the project are defined in the following paragraphs. Tests are defined in this case to be "system" centered, i.e., hydrostatic tests, vacuum tests, etc., versus inspections which are "component" centered. All tests shall be performed in the presence of a QA/QC inspector or his designate. All tests shall be documented with a written test report. The test report shall include a description of the test, the item or items tested, the procedure used, the date and time of the test and the test results. All test documentation shall be signed by the inspector.

A. Fuel System Tests

All fuel system piping shall be subjected to hydrostatic leak testing to 1.5 times the design pressure. Non-pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3 to conduct examination for leakage. Pneumatic tests on the PE or RTR may be substituted at 1.2 times design pressure.

B. Lube Oil System Tests

All Lube Oil System piping shall be subjected to hydrostatic leak testing to 1.5 times the design pressure. Non-pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3.

C. Hydraulic Starter System Tests

All Hydraulic Starter System piping will be subjected to hydrostatic leak testing to 1.5 time the design pressure. Non-Pipe components of the system shall be isolated from the test. The hydrostatic leak test pressure shall be held for a minimum of 1 Hour and then reduced in accordance with ANSI B31.3.

D. Process Water System Tests

All metallic process water system piping will be leak service tested prior to commissioning. The piping systems under test will be brought up to Normal Operating Pressure and this pressure will be held for 10 minutes or as long as it takes to check each joint or fitting on the line under test. Test shall be conducted in accordance with ANSI B31.3 to conduct examination for leakage. Piping Systems which will be tested in this manner are the following:

- Cooling Water Systems (New Piping)
- Oily Water Piping

E. Instrument Air System Leak Tests

Instrument air piping systems will be subjected to a Pneumatic leak test following installation. Pressures will be raised to Normal Operating Pressures levels for each system and held for a minimum of 10 minutes.

X. SPECIFIC TESTS – ELECTRICAL

A. Ground Grid Integrity Test

The new installed grounding cables/rods will be attached to the existing system. Installed Ground Grid will be tested using a suitable multimeter to measure integrity prior to startup. Continuity and resistance will be confirmed for the new installed cables/rods. The readings will be recorded for record.

B. Cable Insulation Testing - Megger

All 600 Volt and above wire and cable to be used on this project will undergo an insulation test or tests to ensure cable is suitable for intended usage and has structural integrity for installation. All low voltage cables, below 600 volts, will be tested for continuity prior to being energized.

All medium and high voltage cable and wire will undergo Megger testing. Cables will be tested to levels established not to exceed the rated voltage of the cables. Megger testing will be performed with a calibrated test instrument certified to national standards.

The results will be recorded and maintained for record. A cable failing a Megger test will be tagged, segregated and removed from the job site.

C. Cable Insulation Testing - Hi Potential Test

Medium and high voltage cables will undergo Hi-Potential testing to detect any insulation breakdown in these cables.

Testing will be accomplished with a calibrated instrument certified to national standards. Results will be recorded and maintained for record.

D. Cable and Conduit Installation - Inspections

All cable, conduit and associated fittings will be checked to ensure compliance to specifications developed for this project. Conduit, fittings and cable installation will be monitored during construction to ensure compliance to NEC codes.

E. Point to Point Testing

All installed cables shall be point-to-point tested prior to being energized. The point-to-point test shall confirm cables are installed as designed and phased properly.

F. Switchgear, Motor Control Centers, Breakers, and other Electrical Components, Instrumentation

All switchgear, motor control centers, breakers and other electrical components, will be inspected and tested prior to and following installation. Specific test procedures will be developed for each major piece of equipment to be installed. Electrical components will be inspected prior to installation and, in most cases, will be tested as part of a larger sub-system. Instrumentation will be inspected prior to installation and calibrated following installation. Instrumentation will be tested as part of a larger sub-system.

XI. FACTORY ACCEPTANCE TESTS / INSPECTIONS

The Client has the right to request the contractor an inspection of the equipment and witness all factory tests prior to shipment to the Project site if schedule allows. Tests will be undertaken at the manufacturer or fabricator's facility prior to being shipped to site.

XII. STARTUP TESTING AND COMMISSIONING

Startup testing and commissioning will involve integration of all sub-systems into a complete system-wide test of operation. Testing will involve operation of all sub-systems listed below:

- Process Water Systems – Raw Water Supply System and Firewater System
- Fuel Gas Delivery System
- Gas Turbine Startup
- Gas Turbine Electrical Transmission
- Breaker Operation
- Protective Relays, Breaker Testing

XIII. REPORTS

A copy of all inspection and test reports shall be maintained in a file at the project site. These reports shall be made available for review and reference as may be required throughout the project. The original copies of all inspection and test reports shall be forwarded periodically to the Quality Assurance Manager for review and safekeeping. Quality related problems that cannot be readily corrected at the project site will be immediately referred to the Quality Assurance Manager for resolution.

Section 10.0 Exceptions and Clarifications

For clarification of the project the following exceptions and assumptions are stated:

10.1 The Scope of Supply of this document does not include the following outlined items:

- Real estate property on which the Power Project is to be sited.
- Local, state, and/or government taxes associated with the Owner's Corporations.
- Local, state, and/or government taxes associated with the Contractor furnished equipment.
- Any site environmental cleanup or modifications to site.
- Environmental permits. (Note: Contractor will assist in obtaining all permits where applicable.)
- Local county or state construction permit. (Contractor will assist in obtaining.)
- Fuel gas for blow down, flushing, commissioning, start-up, and operation.
- Supply of Owner furnished items as outlined in Section 2.0 of this Proposal.
- Operating spares. (Contractor will submit a list of recommended spare parts.)
- Engineering, Design or Construction per specifications and requirements different than those submitted and verbally agreed to for the 3 x FT8 GTGs on this same site.
- Scope of Work including the GSU 230KV connection to Owner's 230KV substation.
- Gas Turbines capable of consuming LPG.
- Schemes to capture or prevent emergency release of Natural Gas to atmosphere.

10.2 This proposal is also based on the following assumptions:

- Owner to supply to Contractor or receive the items outlined in Section 3.0
- Owner will provide all authority required to make the proposed utility interconnects.
- Owner will provide complete site for use as described in the TSD and associated drawings.
- Contractor to furnish and install "first fill" lubricants and chemicals for the plant.

- Contractor will provide soil borings to be utilized for site design.
- Owner to provide site survey as necessary
- Owner to provide custody transfer fuel metering and interconnect point at site boundary as shown on drawings.
- Owner to provide fuel for plant commissioning and start-up.
- Owner to provide rights-of-way for roadways, entrances, pipeline, and transmission line to the Power Project.
- Performance guarantees, administration of warranty conditions will be discussed and agreed upon and inserted into the appropriate sections of this document at contract signing.
- Contractor will transfer software licenses to the Owner at the completion of the project. This will include the license documentation passwords and keys. It will be the responsibility of the owner to maintain these licensing articles for the time when the software needs to be reinstalled.
- The Contractor supplied DCS shall allow for system expansion through the addition of controllers, operator stations in the control panels, process I/O systems and / or process controllers while the equipment associated with the controller/computer are in manual mode. Modifications can be performed while the Power Plant is operational and the equipment in question is in manual mode. Proper safety precautions must be adhered to. "Tag out" procedures may be required.
- Operator stations in the control room can be expanded while in remote mode and the Power Plant is operational.
- Various vendor supplied PLCs for the major equipment will use either function block or ladder logic programming. The Balance of Plant PLC will use ladder logic programming. The Gas Turbines will utilize a GE designed control system.
- Owner accepts the use of Contractors proposed Codes, Standards and Specifications for this project.

10.3 Contractor's Key Issues in Owner's Specifications Referenced include:

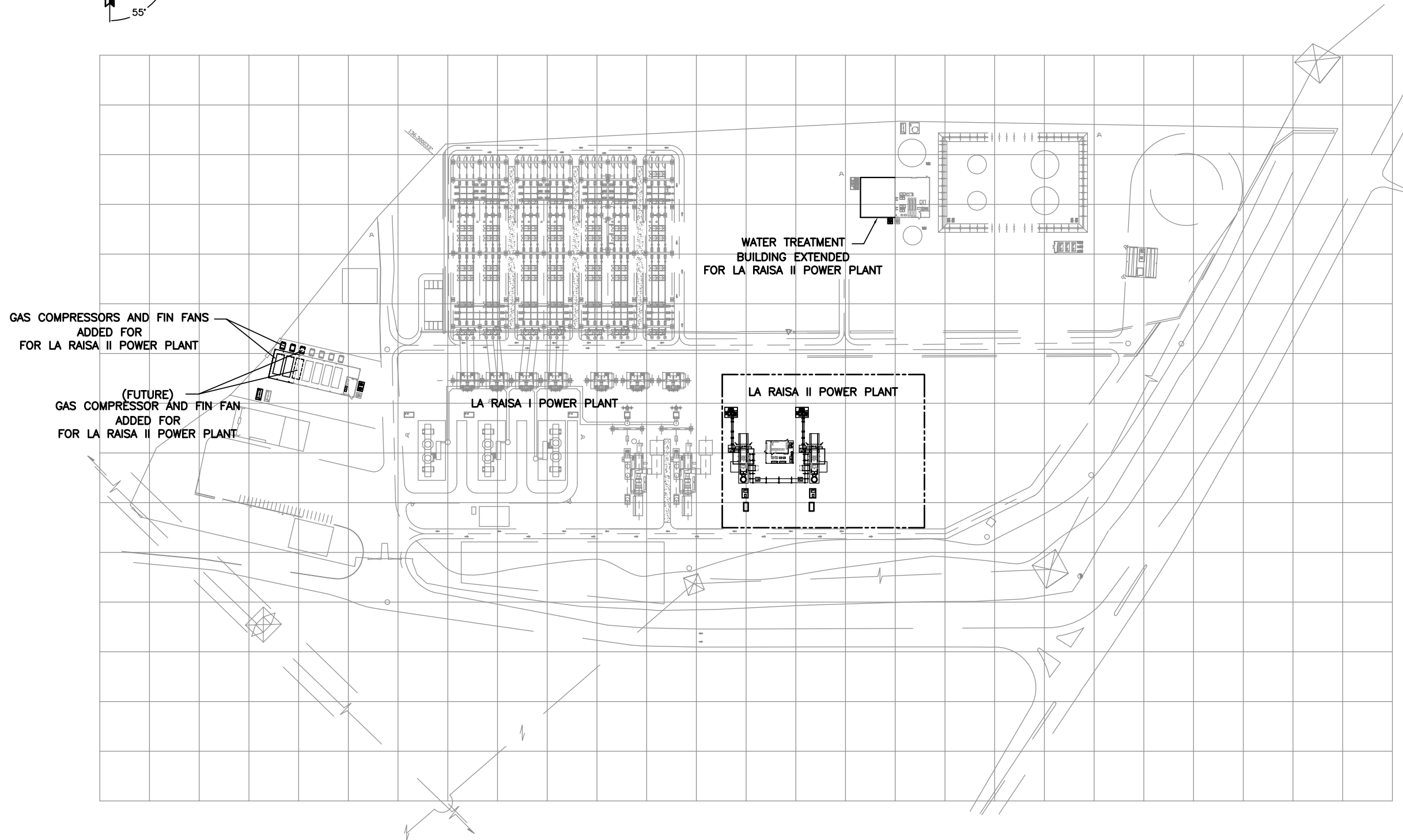
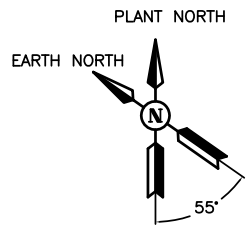
- **Natural gas tightly limited relief to atmosphere (No odorizing)**
- **COVENIN Specifications and it applies in any other nation, based upon the most demanding.**
 - **COVENIN 1294 Hydrants**
 - **COVENIN 200 "National Electric Code"**
 - **COVENIN 758 "Manual Alarm Stations"**

- COVENIN 823 “instructive guide on detection systems, alarm and fire fighting”
 - COVENIN 1041 Central Board of detection and fire alarm”
 - COVENIN 1176 “detectors. General”
 - COVENIN 1329 fire protection systems. Symbols”
 - COVENIN 1377 “automatic fire detection. Components”
 - COVENIN 1382 “hot spot detector”
 - COVENIN 1420 “optical smoke detector (photoelectric)
 - COVENIN 1443 “ionization smoke detectors”
 - Codes, Standards, and publications
 - Venezuela Commission for Industrial Standards (COVENIN)
- **Basic Engineering**
 - Logic and functional diagrams
 - Drawings of architectural details
 - Plans for details of security systems, fire detection
 - Currently operating philosophy of the plant is simple cycle
 - Plan workshop
 - EDC reserves right to approve development of all basic and detailed engineering, and acquisition of all the teams that make up this range, including any other equipment that may compromise the efficiency and reliability of the plant.
- **RULES OF THE EDC**
- **Operations rules**
- **Standards of Materials**
- **Other Rules**

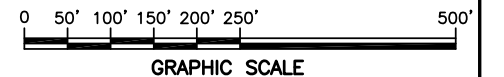
Section 11.0 Drawings


Please find on the following pages the following preliminary project drawings.

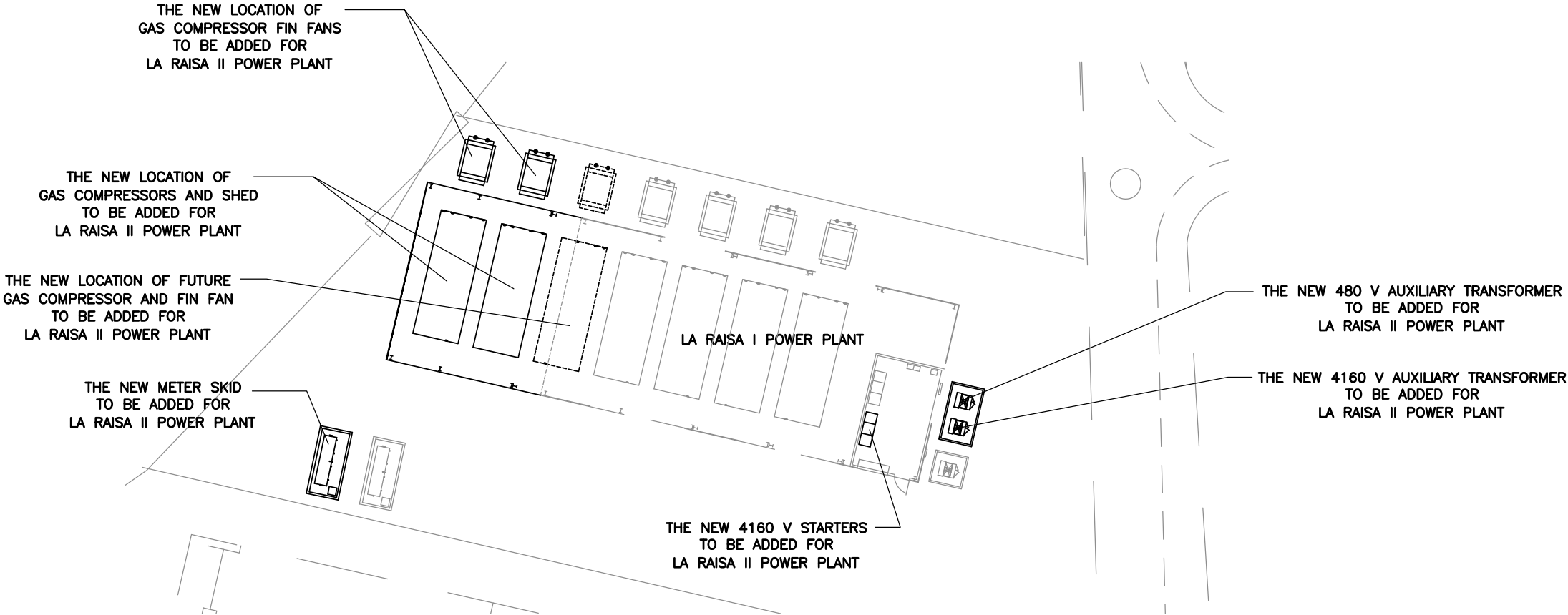
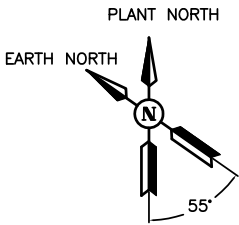
Overview Site Plant Lay-Out	10-001 Sh 1
General Arrangement Plot Plan	10-002 Sh 2
General Arangement Plot Plan	10-002 Sh 3
Process Flow Diagram	50-001 Sh 1
Process Flow Diagram	50-001 Sh 2
One Line Diagram	60-001 Sh 1
One Line Diagram	60-001 Sh 2
One Line Diagram	60-001 Sh 3
One Line Diagram	60-002 Sh 1
One Line Diagram	60-003 Sh 1
One Line Diagram	60-004 Sh 1
One Line Diagram	60-005 Sh 1



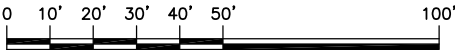
- THE GRID IS A 100' SQUARE.
- SEE LA RAISA I POWER PLANT
DWG. NO. T9018-10-001 SH
1 FOR DETAILS.



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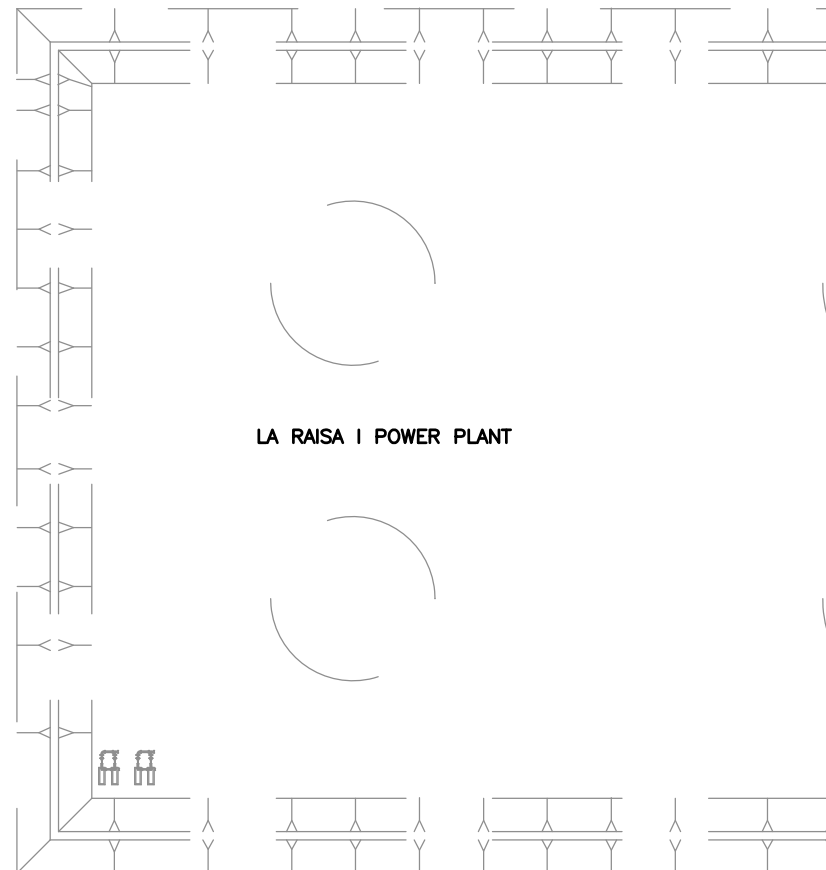
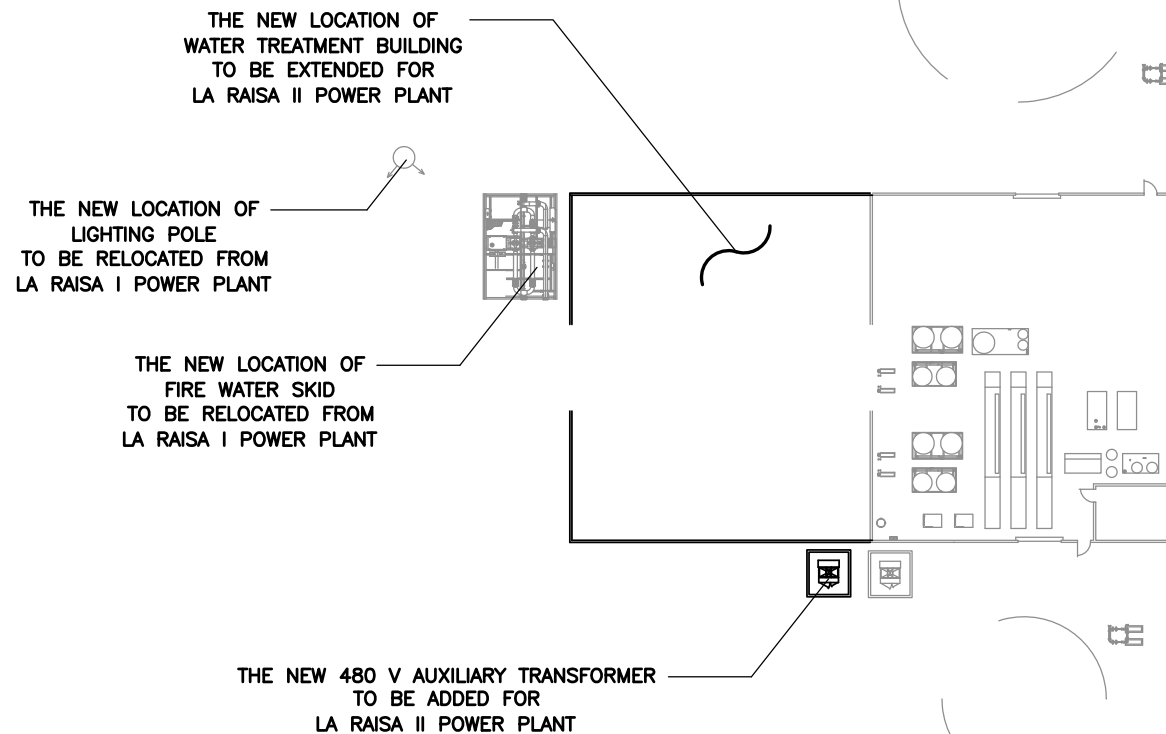
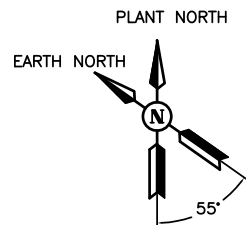


- SEE DRAWING NUMBER 10-001 SH 1
FOR OVERVIEW GENERAL ARRANGEMENT
PLOT PLAN.

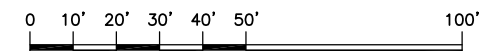


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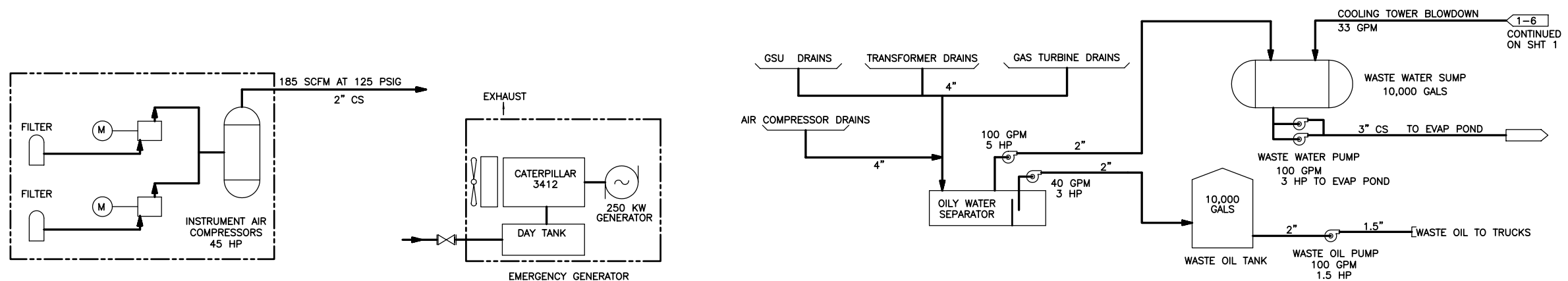



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PLOT PLAN.

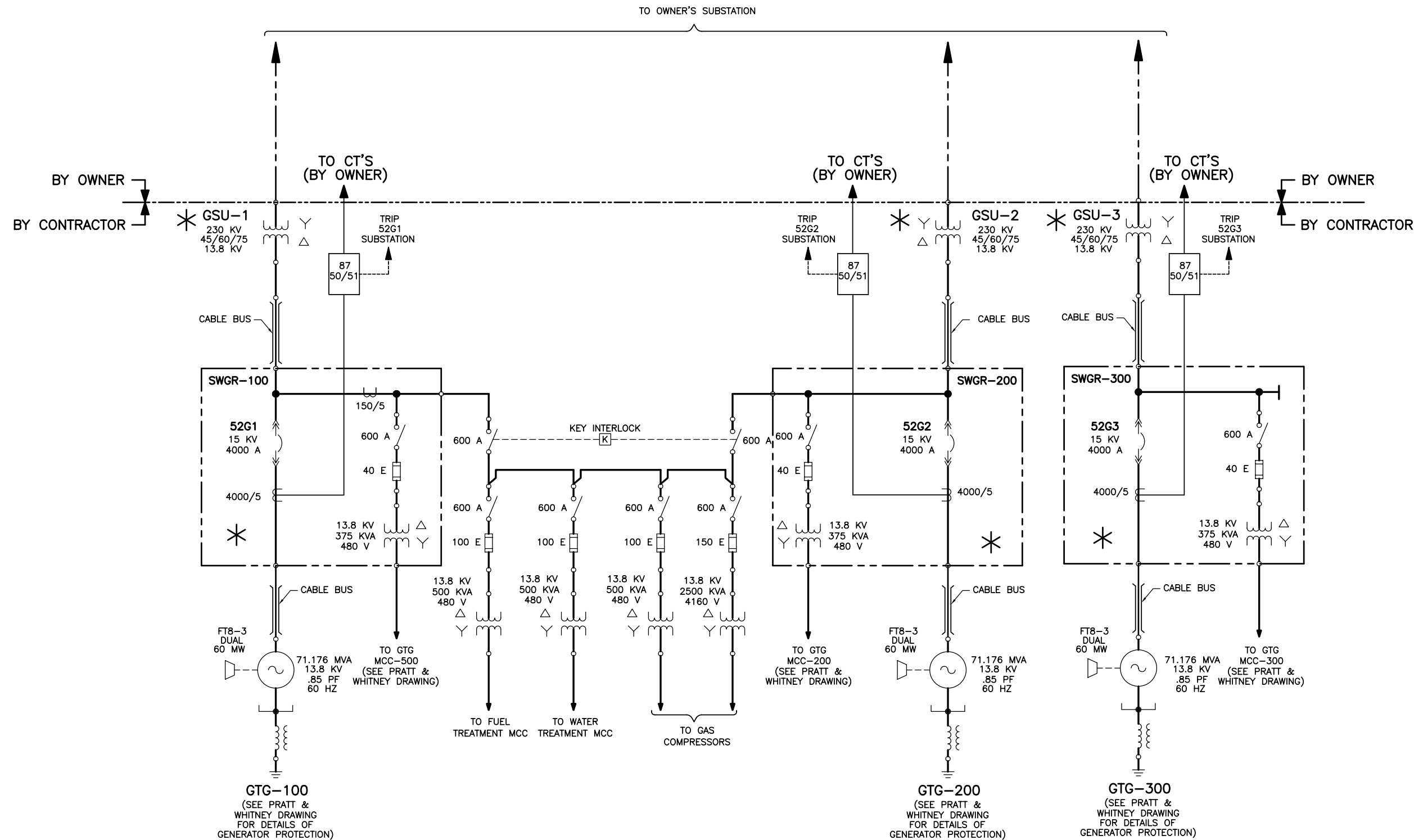


GRAPHIC SCALE

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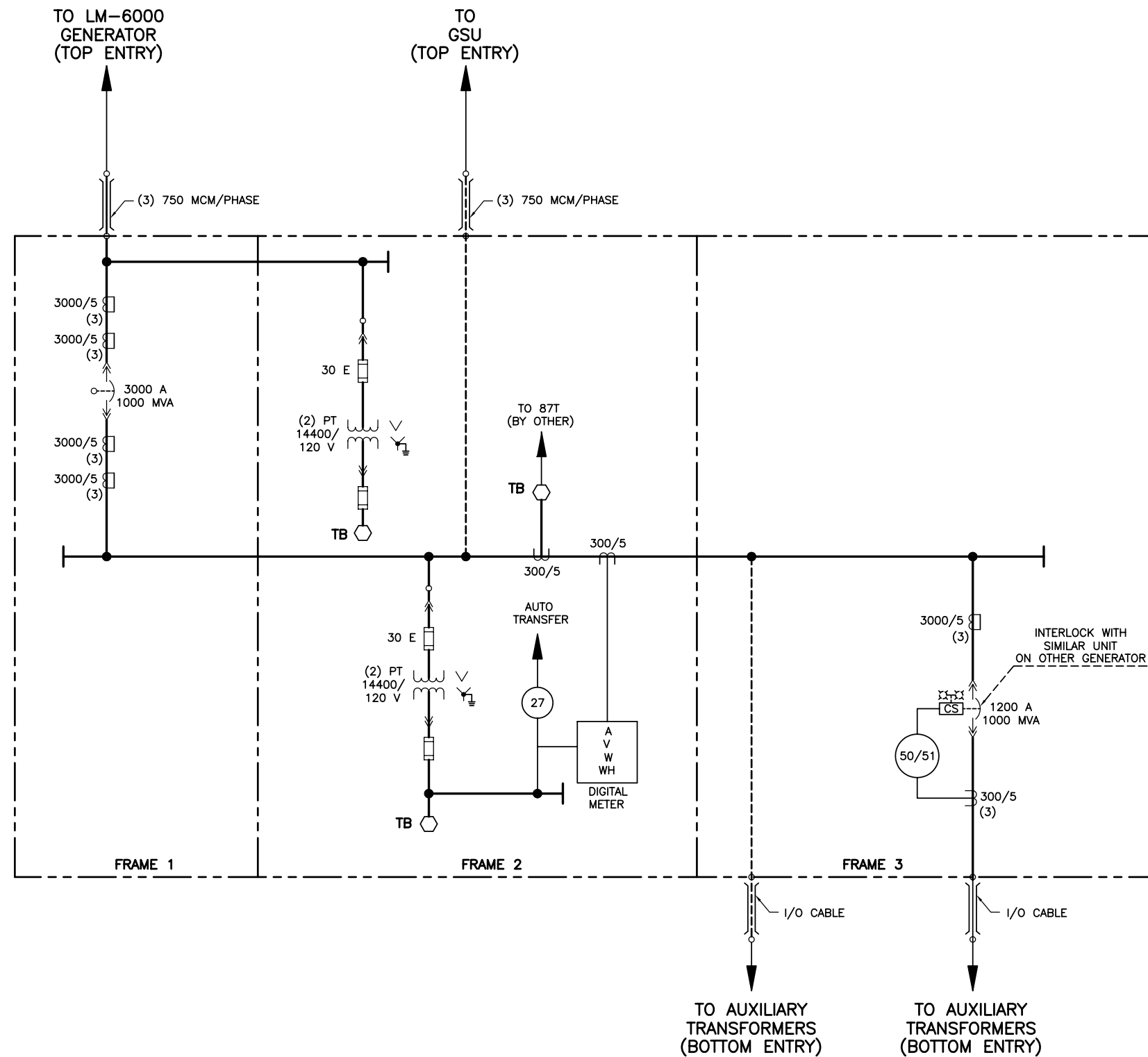


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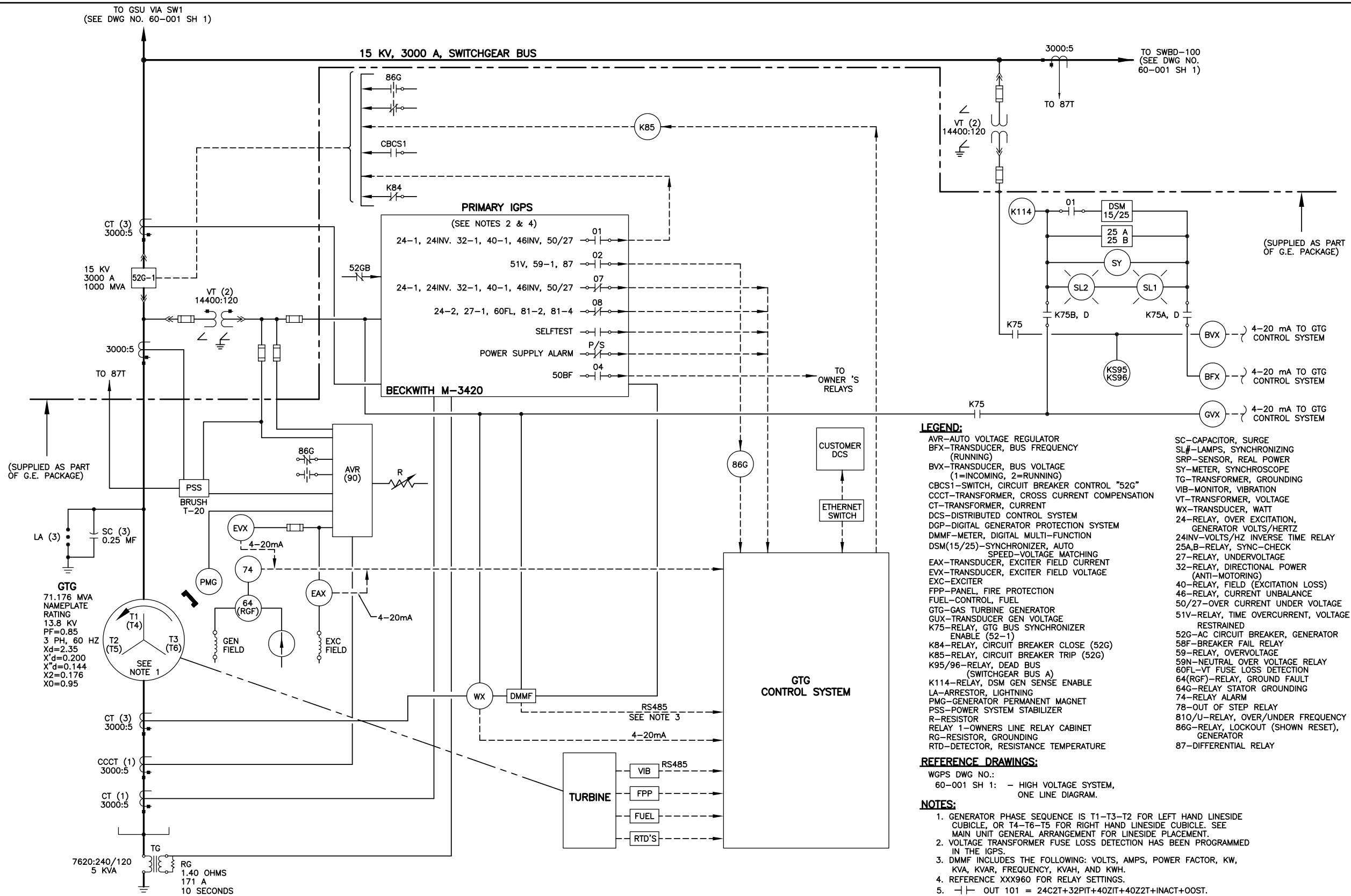
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- NOTES:
1. NEMA 3R CONSTRUCTION.
 2. TWO (2) UNITS REQUIRED.

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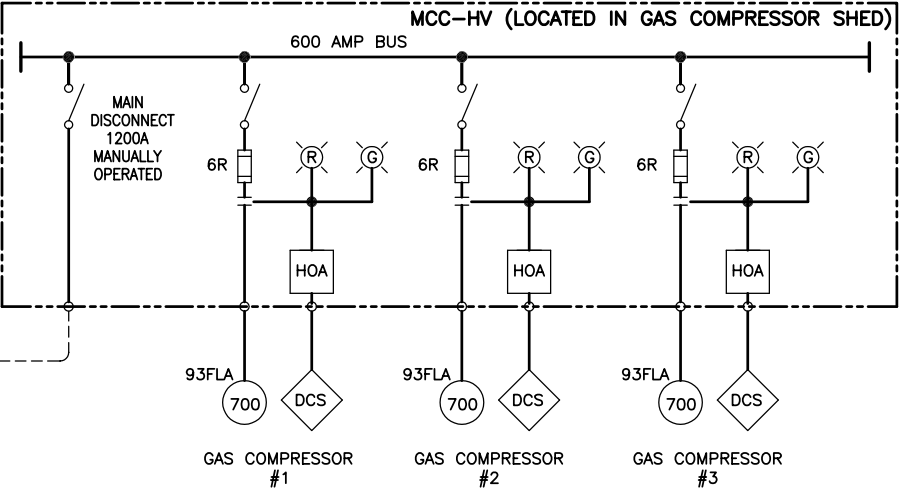


TYPICAL

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TO SWBD-100
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60-001 SH 1

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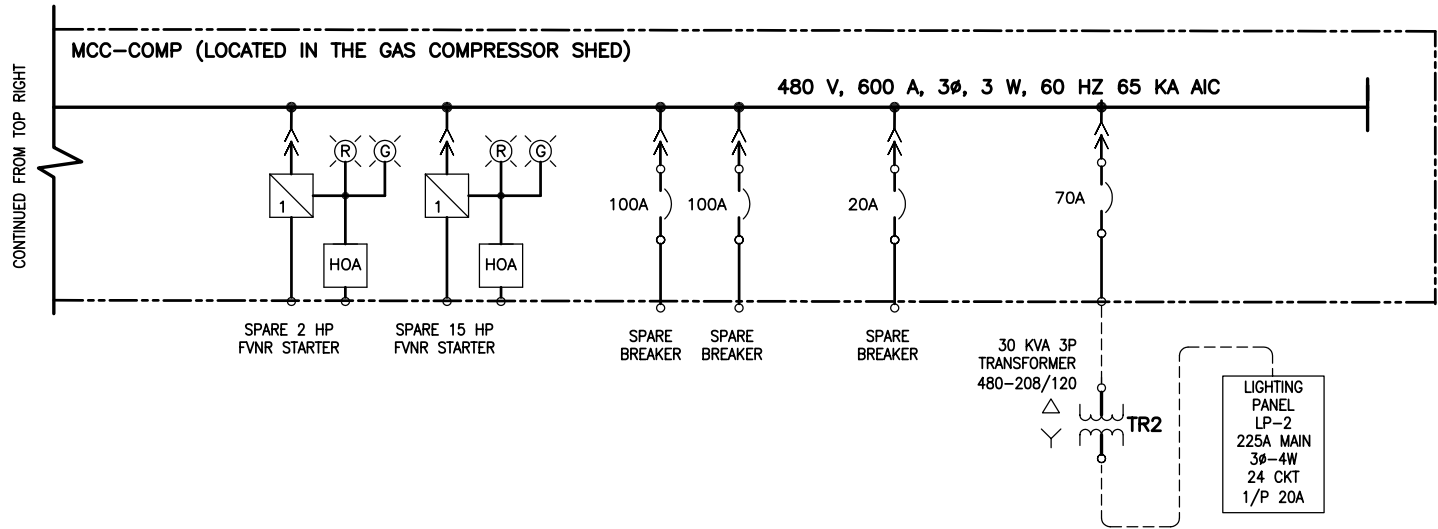
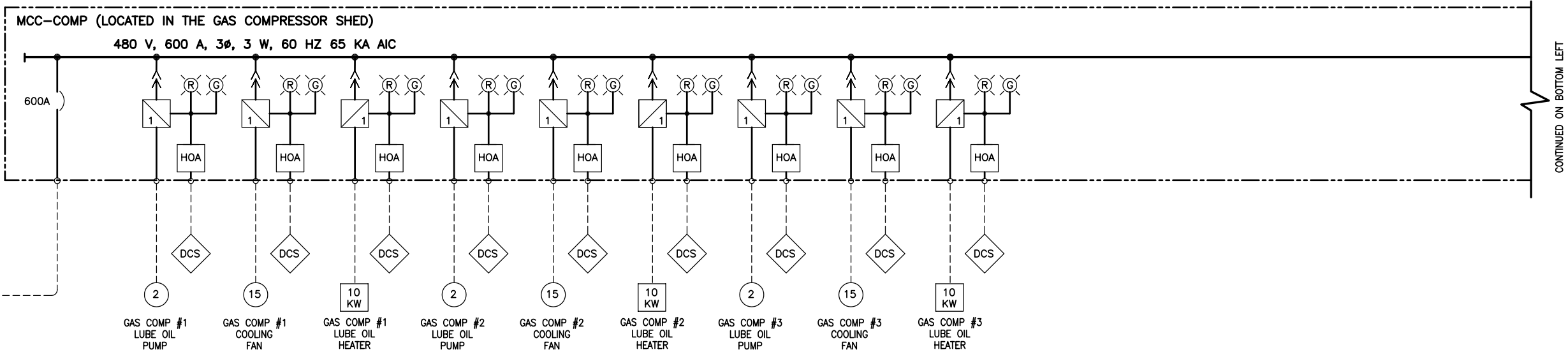
LEGEND:

- COMBINATION STARTER (BREAKER TM WITHOUT OVERLOADS) STARTER SIZE
- COMBINATION STARTER (BREAKER WITH MOTOR OVER LOADS) MCP STARTER SIZE
- HOA - HAND-OFF-AUTO SWITCH
- 10 - MOTOR HORSEPOWER (HP)
- R - INDICATING LIGHT COLOR
- TCP - TURBINE CONTROL PANEL
- MOTOR SPACE HEATER
- OVERLOAD RELAY 50 TIME 51 INST TRIP
- BREAKER DRAW OUT TYPE
- BREAKER ELECTRICALLY OPERATED
- BREAKER MANUALLY OPERATED
- BREAKER DRAW OUT

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															T9036	60-003	1	A


TO SWBD-100
DWG. NO.
60-001 SH 1

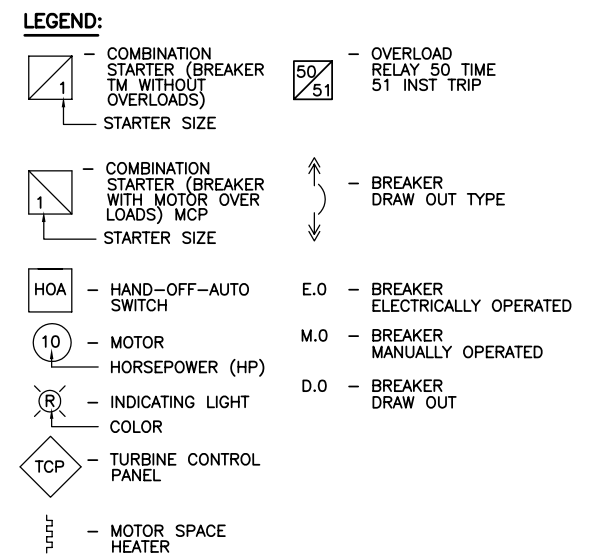
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CABLE




LEGEND:

- COMBINATION
STARTER (BREAKER
TM WITHOUT
OVERLOADS)
- STARTER SIZE
- COMBINATION
STARTER (BREAKER
WITH MOTOR OVER
LOADS) MCP
- STARTER SIZE
- HOA
- HAND-OFF-AUTO
SWITCH
- 10
- MOTOR
HORSEPOWER (HP)
- R
- INDICATING LIGHT
COLOR
- TCP
- TURBINE CONTROL
PANEL
- 50/51
- OVERLOAD
RELAY 50 TIME
51 INST TRIP
- BREAKER
DRAW OUT TYPE
- E.O
- BREAKER
ELECTRICALLY OPERATED
- M.O
- BREAKER
MANUALLY OPERATED
- D.O
- BREAKER
DRAW OUT
- MOTOR SPACE
HEATER

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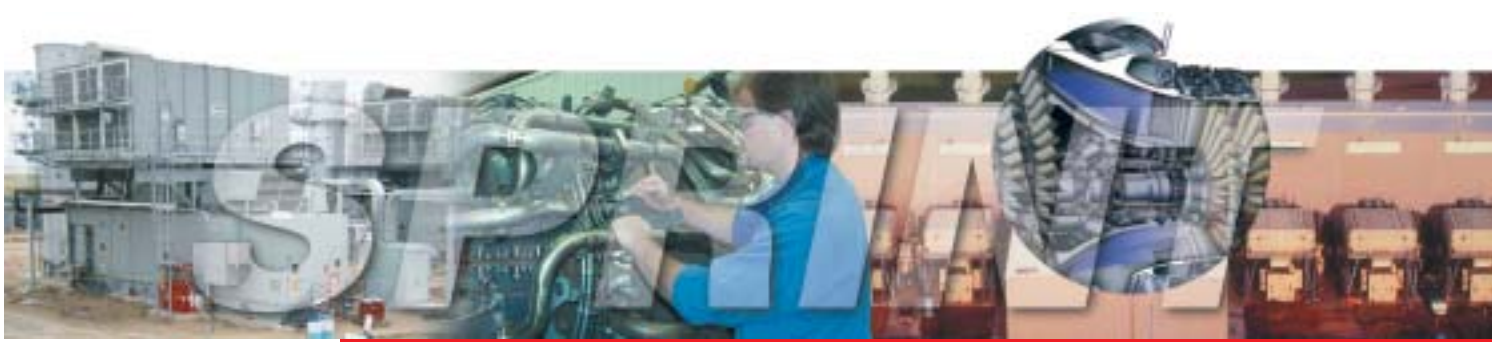


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																		LA RAISA		VENEZUELA		
																		JOB. NO.	DWG NO.	SH NO.		
																		T9036	60-005	1		
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Section 12.0 Appendix

- 12.1 Site Meteorological Data (By Owner)**
- 12.2 Site Location Map (By Owner)**
- 12.3 Parasitic Loads (To be provided)**
- 12.4 Raw Water Analysis (To be provided)**
- 12.5 Fuel Gas Analysis (To be provided)**
- 12.6 Soils Analysis (To be provided)**
- 12.7 Major Equipment Specifications**
 - 12.7.1 LM6000 PC (60Hz) Gas Turbine Generators**
 - 12.7.2 Fuel Gas Compressors**
 - 12.7.3 Instrument Air Compressors**
 - 12.7.4 13.8 KV Generator Breakers**
 - 12.7.5 Plant DCS System (By ProEnergy EPC)**

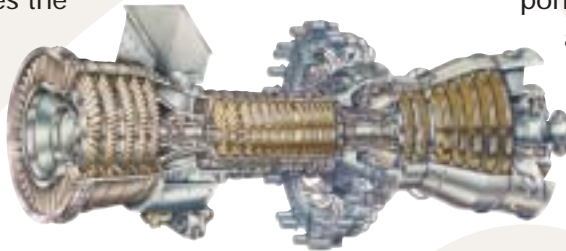
Section 12.7.1 LM6000 PC (60Hz) Gas Turbine Generators (See Next Pages)



LM6000 SPRINT™ Gas Turbine Generator Set

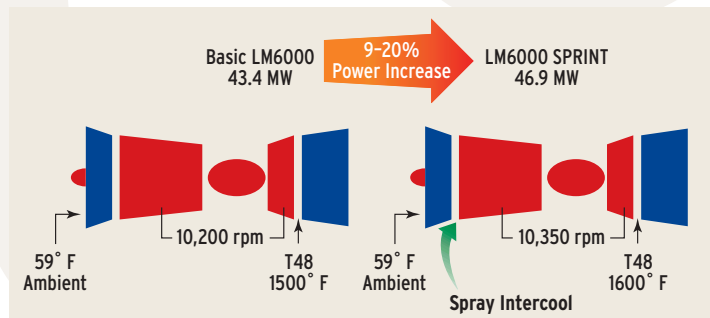
The Inter-cooled Engine that Increases Power Output

The LM6000 SPRINT™ combines the best simple-cycle heat rate of any industrial gas turbine in its class today with a spray inter-cooling design that significantly increases the mass airflow by cooling the air during the compression process. The result is more power, a better heat rate and a gas turbine without any increase in maintenance costs.



The Hotter It Gets, The More Effectively It Runs

SPRINT's™ effectiveness is even more pronounced in hot weather—power output is increased by 9% at ISO and is increased by more than 20% on 90° days. It is like having an evaporative cooler built within the gas turbine. As ambient temperature rises, the benefits of a SPRINT™ engine become more significant.



The SPRINT™ Solution

The SPRINT™ system is based on an atomized water spray injected through spray nozzles into the compressor. Water is atomized using high-pressure air taken off of eighth stage air bleed. The water-flow rate is metered, using the appropriate engine control schedules.

The SPRINT™ Solution at Work

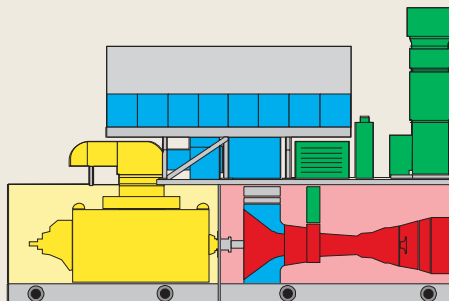
On high-pressure ratio gas turbines such as the LM6000, the compressor discharge temperature is often the criteria that limits power output because compressed air is used to cool the hot section components. By pre-cooling the LM6000 compressor with a micro-mist of water, the compressor inlet temperature and outlet temperature are significantly reduced. Thus, the compressor outlet temperature limitation is reduced allowing the LM6000 to operate on its natural firing temperature control.

The result is higher output and better efficiency.



SPRINT 60-Hz Generator Sets

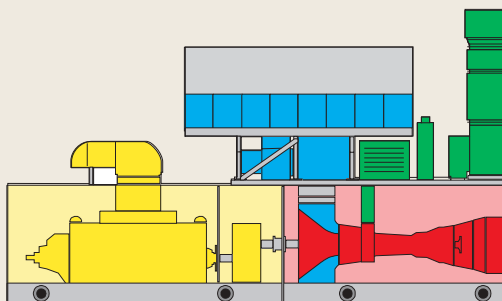
Base Plate Length	56' 6"	(17.22 m)
Base Plate Width	13' 6"	(4.11 m)
Enclosure Height	14' 6"	(4.42 m)
Overall Length	56' 9"	(17.30 m)
Overall Width*	49' 9"	(15.16 m)
Overall Height*	36' 2"	(11.02 m)
Base Plate Foundation Load*	476,000 lb	(214,200 kg)



	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC SPRINT*	50080	8434	8916	2	30.9	3600	295	134	826	441
LM6000PC	43417	8112	8549	2	29.1	3600	281	127	831	444
LM6000PD SPRINT	46824	8235	8688	2	30.7	3600	290	131	837	447
LM6000PD	42336	8308	8765	2	29.3	3600	278	126	846	452
LM6000PD (liquid fuel)	40212	8415	8878	2	28.1	3600	268	122	857	458
LM2500PK	30676	8834	9300	2	23.6	3600	192	87.1	958	514
LM2500PV	30463	8854	9069	2	22.6	6100	186	84.3	931	499
LM2500PH**	27763	8391	8775	2	20.2	3600	167	75.9	926	497
LM2500PE	22719	9311	9789	2	19.1	3600	153	69.4	992	533

SPRINT 50-Hz Generator Sets

Base Plate Length	64' 7"	(19.69 m)
Base Plate Width	13' 6"	(4.11 m)
Enclosure Height	14' 6"	(4.42 m)
Overall Length	64' 10"	(19.76 m)
Overall Width*	49' 3"	(15.01 m)
Overall Height*	37' 11"	(11.56 m)
Base Plate Foundation Load*	522,000 lb	(234,900 kg)



	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC SPRINT*	50041	8461	8961	2	31.0	3627	297	135	821	438
LM6000PC	42890	8173	8617	2	29.1	3627	282	128	825	441
LM6000PD SPRINT	46902	8272	8739	2	30.9	3627	292	133	834	446
LM6000PD	41711	8374	8846	2	29.3	3627	279	127	838	448
LM6000PD (liquid fuel)	40376	8452	8917	2	28.5	3627	272	123	853	456
LM2500PK	29244	9177	9675	2	22.8	3000	193	87.7	967	519
LM2500PV	30349	8577	9069	2	21.5	6100	186	84.3	931	499
LM2500PH**	26463	8673	9080	2	19.4	3000	168	76.2	932	500
LM2500PE	21719	9653	10141	2	18	3000	154	69.8	1000	538

Mechanical-Drive Sets

	Heat Rate Btu/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC	5941	2	29.1	3600	281.9	127.8	825	440
LM2500PK	6442	2	22.5	3600	192.0	87.1	958	514
LM2500PV	6187	2	21.5	6100	186.0	84.3	931	499
LM2500PE	6773	2	22.8	3600	153.0	69.4	992	533

Note: Performance based on 59° F amb. Temp. 60% RH, sea level, no inlet/exhaust losses on gas fuel without NOx media, unless otherwise specified.

*SPRINT 2002 deck is used with water injection to 25ppmvd for power enhancement

**Rating includes use of 50,000 lb/hr steam injection.

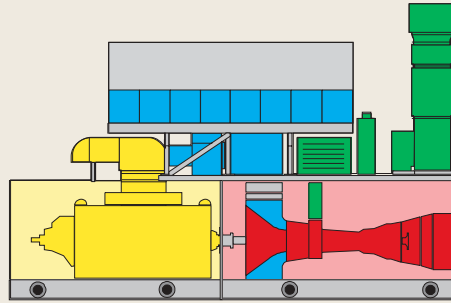


GE Aero Energy Products

A GE Power Systems Business

SPRINT™ 60-Hz Generator Sets

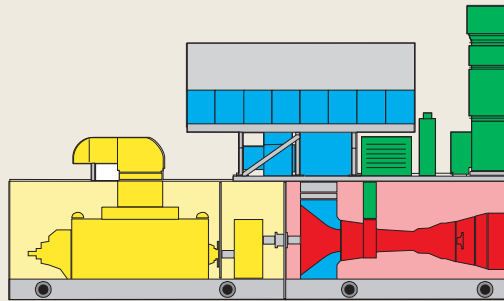
Base Plate Length	56' 6"	(17.22 m)
Base Plate Width	13' 6"	(4.11 m)
Enclosure Height	14' 6"	(4.42 m)
Overall Length	56' 9"	(17.30 m)
Overall Width*	49' 9"	(15.16 m)
Overall Height*	36' 2"	(11.02 m)
Base Plate Foundation Load*	476,000 lb	(214,200 kg)



	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC SPRINT™ *	50080	8434	8916	2	30.9	3600	295	134	826	441
LM6000PC	43417	8112	8549	2	29.1	3600	281	127	831	444
LM6000PD SPRINT™	46824	8235	8688	2	30.7	3600	290	131	837	447
LM6000PD	42336	8308	8765	2	29.3	3600	278	126	846	452
LM6000PD (liquid fuel)	40212	8415	8878	2	28.1	3600	268	122	857	458
LM2500PK	30676	8834	9300	2	23.6	3600	192	87.1	958	514
LM2500PV	30463	8854	9069	2	22.6	6100	186	84.3	931	499
LM2500PH**	27763	8391	8775	2	20.2	3600	167	75.9	926	497
LM2500PE	22719	9311	9789	2	19.1	3600	153	69.4	992	533

SPRINT™ 50-Hz Generator Sets

Base Plate Length	64' 7"	(19.69 m)
Base Plate Width	13' 6"	(4.11 m)
Enclosure Height	14' 6"	(4.42 m)
Overall Length	64' 10"	(19.76 m)
Overall Width*	49' 3"	(15.01 m)
Overall Height*	37' 11"	(11.56 m)
Base Plate Foundation Load*	522,000 lb	(234,900 kg)



	Power kW	Heat Rate Btu/kWh LHV	Heat Rate kJ/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC SPRINT™ *	50041	8461	8961	2	31.0	3627	297	135	821	438
LM6000PC	42890	8173	8617	2	29.1	3627	282	128	825	441
LM6000PD SPRINT™	46902	8272	8739	2	30.9	3627	292	133	834	446
LM6000PD	41711	8374	8846	2	29.3	3627	279	127	838	448
LM6000PD (liquid fuel)	40376	8452	8917	2	28.5	3627	272	123	853	456
LM2500PK	29244	9177	9675	2	22.8	3000	193	87.7	967	519
LM2500PV	30349	8577	9069	2	21.5	6100	186	84.3	931	499
LM2500PH**	26463	8673	9080	2	19.4	3000	168	76.2	932	500
LM2500PE	21719	9653	10141	2	18	3000	154	69.8	1000	538

Mechanical-Drive Sets

	Heat Rate Btu/kWh LHV	No. Shafts	Pressure Ratio	Shaft Speed rpm	Exhaust Flow lb/s	Exhaust Flow kg/s	Exhaust Temp. °F	Exhaust Temp. °C
LM6000PC	5941	2	29.1	3600	281.9	127.8	825	440
LM2500PK	6442	2	22.5	3600	192.0	87.1	958	514
LM2500PV	6187	2	21.5	6100	186.0	84.3	931	499
LM2500PE	6773	2	22.8	3600	153.0	69.4	992	533

Note: Performance based on 59° F amb. Temp. 60% RH, sea level, no inlet/exhaust losses on gas fuel without NOx media, unless otherwise specified.

*SPRINT™ 2002 deck is used with water injection to 25ppmvd for power enhancement

**Rating includes use of 50,000 lb/hr steam injection.



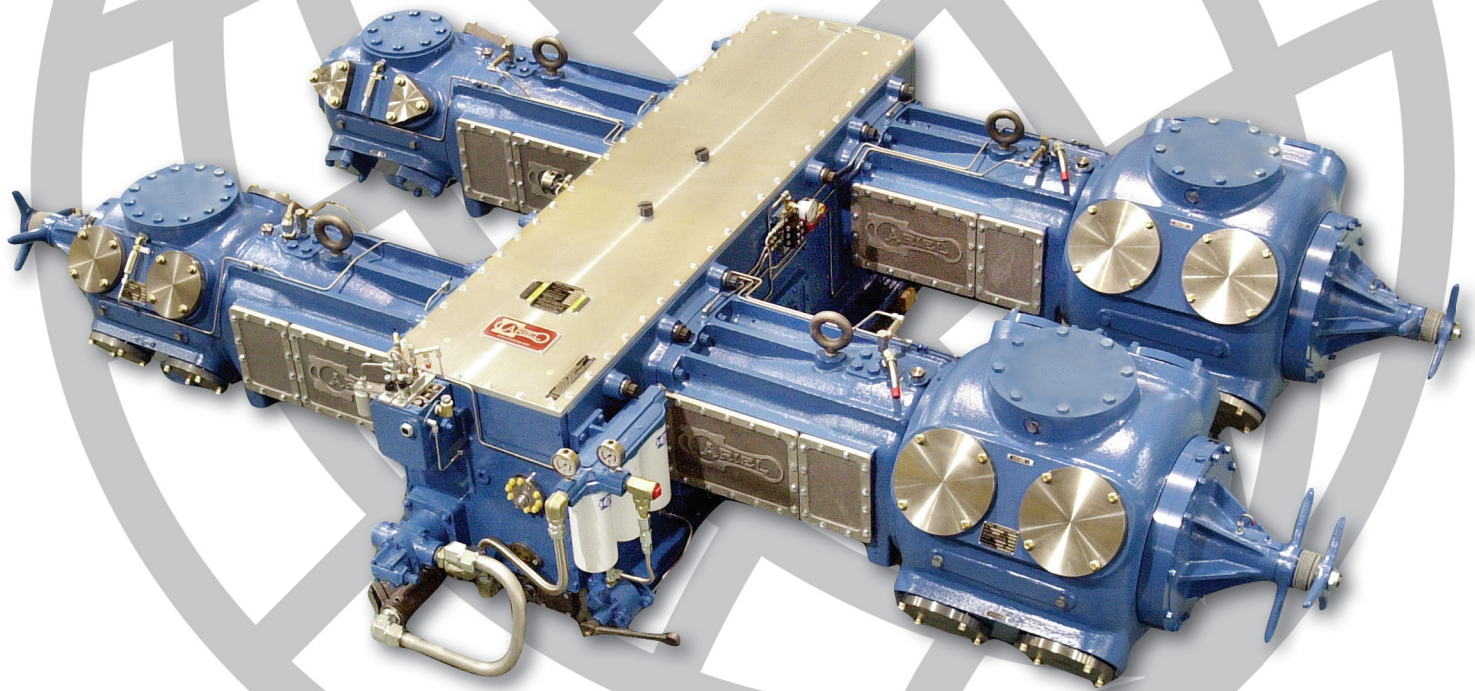
GE Aero Energy Products

A GE Power Systems Business

Piece Box Number	Scope of Supply Rec. Descriptions (Chula Vista 01) (IMS-2009-LM604)	Gross Weight	Length	Width	Height	C.Feet	Receiving Number			
	MAIN PACKAGE									
BX #01	TURBINE BASE	120,000	372	168	176	6,365	DC2-DBCDB20090213D02001	Palletized Storage	435 S.Sheldon Rd	Houston, TX 77530
BX #04	TURBINE BASE INTERCONNECT SHIPLOOSE	460	48	48	17	23	DC1-DBCDB20090209D009005	Dixie Crating	630 McFarland	Houston, TX 77011
BX #05	SHEAR LUGS	1,080	46	28	18	13	DC1-DBCDB20090209D009003	Dixie Crating	630 McFarland	Houston, TX 77011
BX #06	H-FRAME	2,000	174	30	39	118	DC1-DBCDB20090123D023001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #10	EXHAUST FLASHING	780	66	66	24	61	DC1-DBCDB20090213D011001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #11	ELECTRICAL SHIPLOOSE MISC.	1,010	108	42	34	89	SC1 - GE-30086	Dixie Crating	630 McFarland	Houston, TX 77011
BX #12	MECHANICAL SHIPLOOSE MISC. (TEARDOWN)	540	148	21	17	31	DC1-DBCDB20090210D012002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #13	ALIGNMENT TOOL	560	104	30	33	60	DC1-DBCDB20090209D009004	Dixie Crating	630 McFarland	Houston, TX 77011
BX #14	ENGINE LIFT FIXTURE	1,900	130	78	24	414	DC1-DBCDB20090126D013001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #15	GENERATOR	AT TEXAS TERMINALS UNDER DR # 84877					AT TEXAS TERMINALS UNDER DR # 84877			
BX #17	GENERATOR BASE	68,000	338	168	176	5,784	DC2-DBCDB20090213D02002	Palletized Storage	435 S.Sheldon Rd	Houston, TX 77530
BX #19	GEN. LUBE OIL PIPING ASSY. (BRUSH RIGHT)	2,360	201	46	58	310	SC1 - GE-30074	Dixie Crating	630 McFarland	Houston, TX 77011
BX #25	GENERATOR TRANSITION THROAT	1,940.00	125.00	120.00	44.00	382.00	DC1-DBCDB20090213D015001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #26	GENERATOR EXHAUST HOOD	7,480.00	171.00	144.00	84.00	1,197.00	DC1-DBCDB20090210D003003	Dixie Crating	630 McFarland	Houston, TX 77011
BX #27	GENERATOR FAN EXPANSION JOINTS	500.00	52.00	52.00	24.00	38.00	DC1-DBCDB20090112D019001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #32	TURBINE GAUGE PANEL ENCLOSURE	1,160	119	114	18	141	DC1-DBCDB20090209D013002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #33	COUPLING GUARD ASSY. (BRUSH)	420	52	52	20	31	DC1-DBCDB20090204D010001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #36	COUPLING ASSY.	1,390	118	36	40	98	DC1-DBCDB20090205D008001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #37	ROOF SKID	44,000	477	172	151	7,169	DC2-DBCDB20090219D013001	Palletized Storage	435 S.Sheldon Rd	Houston, TX 77530
BX #39	ROOF SKID TRANSITION	1,260	147	72	35	214	DC1-DBCDB20090209D009001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #40	RAIN CAP	1,220	84	84	54	221	DC1-DBCDB20090210D003001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #41	RAIN CAP	1,220	84	84	54	221	DC1-DBCDB20090209D013001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #42	VENTILATION SILENCER	3,520	84	84	131	535	DC1-DBCDB20090302D007002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #43	VENTILATION SILENCER	3,520	84	84	131	535	DC1-DBCDB20090303D003001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #44	VBV DUCT	11,000	156	99	105	930	DC1-DBCDB20090129D013001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #45	VBV SILENCER	8,420	176	75	110	840	DC1-DBCDB20090129D021001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #46	VBV HOOD	2,860	99	99	100	567	DC1-DBCDB20090129D006002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #48	VBV EXPANSION JOINT	740	92	32	26	44	DC1-DBCDB20090128D016001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #52	DEMISTER TANK (GENERATOR LUBE OIL)	760	38	38	75	63	DC1-DBCDB20090205D008002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #53	H.M.I. COMPUTER (LOCAL)	300	35	35	46	33	SC1 - GE-30164	Shipside Crating	16400 Jacintoport	Houston, TX 77015
BX #59	AIR FILTRATION ELEMENTS	2,830	105	85	117	604	DC1-DBCDB20081118D016001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #60	AIR FILTRATION ELEMENTS	2,830	105	85	117	604	DC1-DBCDB20081118D016002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #61	GASKET KIT	440	50	50	48	69	DC1-DBCDB20090205D011001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #62	NUTS, BOLTS & WASHERS	1,940	54	48	40	60	DC1-DBCDB20090209D009002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #63	INSTALLATION SHIPLOOSE 226	440	26	26	26	9	DC1-DBCDB20090224D016001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #64	AUX. SKID	19,940	184	140	125	1,863	DC1-DBCDB20090223D017001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #65	AUX. SKID INLET HOOD	1,640	90	71	47	174	DC1-DBCDB20090205D008003	Dixie Crating	630 McFarland	Houston, TX 77011
BX #68	AUX. SKID INTERCONNECT SHIPLOOSE (RIGHT HAND)	320	66	24	18	17	DC1-DBCDB20090210D003002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #69	WATER INJECTION SKID	6,940	162	64	105	630	DC1-DBCDB20090218D009001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #70	WATER INJECTION SKID	6,900	164	68	105	678	DC1-DBCDB20090217D013001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #71	SPRINT SKID	1,940	66	56	66	141	DC1-DBCDB20090302D007001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #78	LINESIDE CUBICLE	2,560	68	52	126	258	DC1-DBCDB20090211D007002	Dixie Crating	630 McFarland	Houston, TX 77011
BX #79	NEUTRAL CUBICLE	3,760	88	52	126	334	DC1-DBCDB20090219D003001	Dixie Crating	630 McFarland	Houston, TX 77011
BX #82	CONTROL PANEL (TURBINE)	3,880	129	49	102	373	SC1 - GE-30167	Shipside Crating	16400 Jacintoport	Houston, TX 77015
BX #83	HEATERS & BRACKETS (TURBINE BASE)	1,120.00	68.00	44.00	72.00	125.00	DC1-DBCDB20090130D006001	Dixie Crating	630 McFarland	Houston, TX 77011

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Section 12.7.2 Fuel Gas Compressors (See Next Pages)



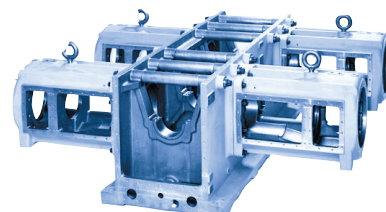
ARIEL JGH and JGE COMPRESSORS

Frame	JGH/2	JGH/4	JGE/2	JGE/4	JGE/6
Number of throws	2	4	2	4	6
Rated Power, BHP	680	1360	1070	2140	3210
Rated Power, kW	507	1014	798	1596	2394
Stroke, inches	4.5	4.5	4.5	4.5	4.5
Stroke, mm	114	114	114	114	114
RPM, maximum	1200	1200	1500	1500	1500
Piston speed, FPM	900	900	1125	1125	1125
Piston speed, m/s	4.57	4.57	5.72	5.72	5.72
Total Rod Load, lbs	48000	48000	60000	60000	60000
Total Rod Load, N	213515	213515	266893	266893	266893
Tension, lbs	24000	24000	30000	30000	30000
Tension, N	106757	106757	133447	133447	133447
Compression, lbs	30000	30000	32000	32000	32000
Compression, N	133447	133447	142343	142343	142343
Average Weight with cylinders, lbs	7300	15100	7300	15100	22900
Average Weight with cylinders, kg	3310	6850	3310	6850	10385
Maximum Length, inches	56	100	56	101	138
Maximum Length, mm	1422	2540	1422	2565	3505
Maximum Width, inches	139	139	139	139	139
Maximum Width, mm	3531	3531	3531	3531	3531
Crankshaft \varnothing (from bottom), inches	17	17	17	17	17
Crankshaft \varnothing (from bottom), mm	432	432	432	432	432

FEATURES

The JGH and JGE are medium- to large-size, separable, reciprocating, gas gathering compressors. They are found by the thousands in gas fields throughout the world. Driver rated, they pair well with modern, high-speed engines and work year after year as one of the most cost-effective choices for rental fleets.

- **Serviceability** - Entire unit is designed for ease of repair. All components are readily accessible.
- **Standardization** - Many components are interchangeable throughout the various lines.
- **Full Pressure Lubrication** - A frame-driven lube oil pump provides pressurized, cooled oil through a full flow oil filter to all moving parts in the frame. A divider block distribution system supplies metered oil to cylinder bores and rod packing. Stainless steel tubing is used throughout the cylinder lubrication system.
- **Unloading Devices** - Manual head-end variable volume clearance pockets, pneumatic fixed volume clearance pockets and pneumatic suction valve unloaders are available on a limited optional basis.
- **Heavy Duty Crankshaft** - Forged steel precision machined with integral counterweights.
- **Rugged Crankcase** - Heavily ribbed (with spacer bars for stiffening), high-strength cast iron base with removable, lightweight aluminum top cover and removable end covers for ease of access.
- **Precision Bearing Shells** - Precision-machined, tri-metal main and connecting rod bearings.
- **Rugged Crossheads and Guides** - Cast iron crosshead guides, external ribbing and removable side covers. One piece, long life crossheads with direct full pressure lubrication at top and bottom for minimum wear. Hardened and ground steel crosshead pins.
- **Rigid Connecting Rods** - Forged steel four bolt, heavy duty "H" section.
- **Quiet Auxiliary Drive** - Fully enclosed and continuously lubricated chain drive adjusted by positive positioning eccentric vernier.
- **Oil and Dust Seal** - Foolproof, non-contacting crankshaft oil seal plus reliable non-wearing dust seal.
- **Proven Cylinder Design** - Non-cooled compressor cylinders with ample nozzles and large gas passages. Cylinder bodies are ion-nitride hardened and drilled for indicator ports.
- **High Strength Bolting** - Grade 8 bolts or B-7 studs on all pressurized components. All bolting designed for accessibility.
- **Efficient Valving** - Ariel uses plate-type valves designed for modern speeds utilizing non-metallic sealing elements as standard. Selected to adhere to established, low valve velocity standards.
- **Durable Pistons** - Wear-resistant ductile or gray iron with wear bands.
- **Stout Piston Rods** - Short, stiff, precision-ground alloy steel piston rods with locking crosshead nut. Rolled threads are 1/4" under rod diameter for easy installation through packing.



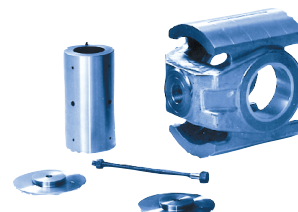
JGH/4 frame



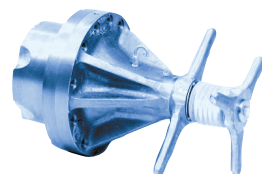
*Forged steel connecting rod used for JGE
(Ductile iron connecting rod used for JGH)*



JGE/4 forged steel crankshaft



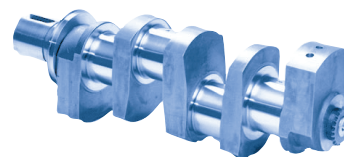
Ductile iron (JGE) crossheads, babbitted shoe surface, full-floating crosshead pin with "through-bolt" and end caps



Head-end variable volume pocket unloader



Full array of JGE crossheads and nuts for precise balancing of pistons



JGH/2 ductile iron crankshaft

CYLINDERS

Double-Acting	Class*	BORE inches	BORE mm	MAWP psi	MAWP bar	Material
	4-5/8ET	4.250, 4.625	108, 117	2600	179	Ductile Iron
	5-1/2ET	5.125, 5.500	130, 140	1725	119	Ductile Iron
	6-3/8ET	6.000, 6.375	152, 162	1270	88	Ductile Iron
	6-3/8ET	6.000, 6.375	152, 162	1650	114	Ductile Iron
	7-3/8ET	7.000, 7.375	178, 187	845	58	Ductile Iron
	7-3/8ET	7.000, 7.375	178, 187	1135	78	Ductile Iron
	7-3/8ET	7.000, 7.375	178, 187	1440	99	Ductile Iron
	8-3/8ET	8.000, 8.375	203, 213	635	44	Ductile Iron
	8-3/8ET	8.000, 8.375	203, 213	800	55	Ductile Iron
	9-3/4ET	9.250, 9.750	235, 248	635	44	Ductile Iron
	11-1/2ET	11.000, 11.500	279, 292	635	44	Ductile Iron
	13-1/2ET	13.000, 13.500	330, 343	300	21	Ductile Iron
	15-3/4ET	15.250, 15.750	387, 400	200	14	Ductile Iron
	17-1/4ET	16.750, 17.250	425, 438	230	16	Ductile Iron
	19-1/2ET	19.000, 19.500	483, 495	200	14	Ductile Iron
	22-1/2ET	22.500	572	205	14	Ductile Iron

Tandem	5-1/2ET-HE	5.125, 5.500	130, 140	1800	124	Ductile Iron
	9-3/4ET-CE	9.250, 9.750	235, 248	635	44	Ductile Iron

NOTE: JGT cylinders also can be mounted on these frames

* HE=Head End, CE=Crank End

More than 35 years ago, Ariel introduced an innovative cylinder design that eliminated water cooling from the cylinder jacket. This proven design yields significant advantages over water-cooled cylinders:

- higher efficiency
- larger gas passages
- reduced pressure-drop losses
- lower maintenance (no scaling or corrosion)

Today, Ariel is the only manufacturer to use an ion-nitride furnace to increase surface hardness of all cylinders. This extra step reduces cylinder bore wear to an absolute minimum. And, to ensure complete reliability in the field, Ariel pressure-tests each cylinder to 150% of maximum allowable working pressure (MAWP) during manufacture.



22-1/2E cylinders, 205 psig, with head-end variable volume clearance pocket unloaders.

THE ARIEL NETWORK

Ariel's success is based on strong relationships built on mutual respect and trust. Employees, vendors, distributors, and end users are all part of the Ariel Network.

Ariel Compressors are marketed and packaged through a long-established network of elite compression system engineering companies. Ariel's Authorized Distributors integrate the compressor with a structural skid, a prime mover, piping, pulsation control, cooling systems, process valving, and control systems.

- All Ariel distributors adhere to Ariel's strict packaging standards.
- Ariel's large network offers the most complete service and parts coverage available in the world.



Model JGH/4, electric motor driven, for offshore Nigeria

CUSTOMER SERVICE



We are committed to supporting our compressors for life. If there is a problem with an Ariel compressor, we'll help you solve it — now.

- The Ariel Network is composed of more than 1000 Ariel-trained field servicemen and technicians, worldwide.
- Ariel's policy has always been to routinely ship standard parts within 24 hours of receiving an order.
- Ariel gas compressors are backed by more than 100 parts and service outlets close to every major natural gas field.
- Ariel's Service and Technical Schools are held frequently, free of charge, for engineers and field servicemen. These courses are taught by Ariel engineers and technicians directly involved in the subject material.
- The availability of Ariel manufactured parts at competitive prices will ensure your Ariel compressor's maximum reliability and productivity.
- Ariel's goal is to offer the best customer care and service. Our warranty and our treatment of warranty issues clearly show our commitment to this goal.

ARIEL CORPORATION WORLD HEADQUARTERS

35 Blackjack Road
Mount Vernon, Ohio 43050 USA
Telephone: 740-397-0311
Fax: 740-397-3856

24-HOUR SUPPORT

Field Service: 740-393-5052
Spare Parts: 740-397-3602
Parts Fax: 740-393-5054

REGIONAL SALES OFFICES

Denver, Colorado • Fort Worth, Texas
Houston, Texas • Miami, Florida
Buenos Aires, Argentina • Jakarta, Indonesia
Bielsko Biala, Poland • Moscow, Russia
Singapore • New Delhi, India



● www.arielcorp.com

Section 12.7.3 Instrument Air Compressors (See Next Pages)



Presented to:

Prepared by:
David Gaede

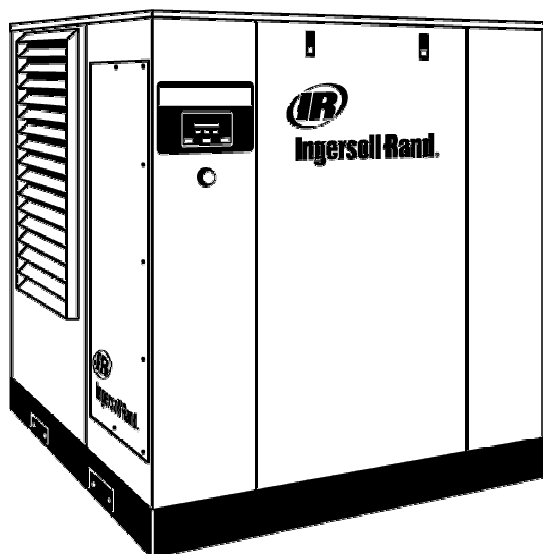
Sales Consultant - Air Systems
Duncan Industrial Solutions
Tulsa, OK 74146
Direct: 800-375-5678 ext 8634
Fax: 405-488-3934

Proposal: 91906DG5
September 19, 2006

EPE 50

Detailed Scope of Supply

All amounts are displayed in US dollars



Technical Information:

Capacity- 185 cfm @ 125 PSIG

Maximum Operating Pressure- 128 PSIG

Weight- 2,000 lbs

Outlet Size- 1.5 " NPT

Dimensions- Facing control panel*

(L* x W x H)- 64"x 67"x 67"

Package Amp Draw Table-

200/3/60- 158.8 Amps 230/3/60- 137.6 Amps

460/3/60- 69.3 Amps 575/3/60- 55.5 Amps

Sound Level- per CAGI-PNEUROP PN2CPTC2

Standard enclosure- 85 dBA

Low sound enclosure- 75 dBA

Aftercooler CTD- 15 °F

Fan Air Flow- 6,700 cfm

Items as specified below

<u>QTY</u>	<u>Description</u>	<u>Unit Price</u>	<u>Total Price</u>
1	SSR EPE-50 Rotary Screw Air Compressor		
1	460V Open Drip Proof Full Voltage Motor/Starter		Included
1	Aircooled Aftercooler		Included
	The SSR 50-100Hp compressor utilizes a swing-out cooler. This unique design facilitates cooler access and provides a simple means of collecting and disposing of dirt and debris. The design also enables the package to run cooler.		
1	Intellisys Controller		Included

EPE 50

The Intellisys microprocessor utilizes a finger-touch membrane panel providing access to all adjustments and key operating parameters. By automatically warning and/or stopping the compressor, Intellisys then displays the problem eliminating costly troubleshooting and minimizing downtime. Intellisys provides five display standards, four adjustable operating parameters, two fault warnings and eight fault shutdowns.

1	3 Micron Air Filter	Included
---	---------------------	----------

Ingersoll-Rand air compressors are supplied with air filters that are 99.9% efficient at 3 micron and above.

1	Sound Attenuating Enclosure	Included
---	-----------------------------	----------

Panels come with quick release latches for easy removal and maintenance. All panels are protected by a high quality powder coat finish.

1	Standard Factory Warranty	Included
---	---------------------------	----------

The Company warrants that the equipment manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment from the factory, whichever shall first occur. The Purchaser shall be obligated to promptly report any failure to conform to this warranty, in writing to the Company in said period, whereupon the Company shall, at its option, correct such nonconformity, by suitable repair to such equipment or, furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labor performed by the Purchaser or others without Company's prior written approval. The effects of corrosion, erosion and normal wear and tear are specifically excluded. Note that this is Ingersoll_Rand standard warranty. Any warranty in force at the time of purchase of the compressor or negotiated as part of the purchase order may take precedence over this warranty.

1	Modulation Control	Included
---	--------------------	----------

Upper Range Modulation adjusts the flow between 60% and 100% of rated capacity to match the system demand, dramatically increasing airtend life.

1	Ultra Coolant	Included
---	---------------	----------



EPE 50

SSR Ultra Coolant is a lubricant specifically formulated for use in the SSR air compressor. The lubricant qualities of this coolant far exceed petroleum base and other synthetic oils. Ultra Coolant has a lifetime of two (2) years or 8000 hours, whichever comes first.

1	Nema 1 Fusible Disconnect W/ Fuses	Included
	Shipped Loose	

TZ220 Heatless Desiccant Dryer

Detailed Scope of Supply

All amounts are displayed in US dollars



TZ500 - Shown do not use for construction

Technical Information:

Capacity- 220 scfm

Dewpoint- -40 °F

Maximum Operating Pressure- 150 PSIG

Weight- 640 lbs

Inlet/Outlet Size- 1-1/2" NPT

Dimensions- (W x D x H)- 41" x 22" x 83"

Desiccant Volume/Vessel- 2.63 Ft³

Lb. Desiccant/Vessel- 126

Amp Draw Table-

115/1/60- 1 Amp

Capacity rating is based on following:

100 psig, 100° F inlet air, 100° F ambient

Items as specified below

<u>QTY</u>	<u>Description</u>	<u>Unit Price</u>	<u>Total Price</u>
1	TZ220 Heatless Desiccant Dryer		
1	110/1/60		Included
1	Standard Factory Warranty		Included

TZ220 Heatless Desiccant Dryer

The Company warrants that the equipment manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment from the factory, whichever shall first occur. The Purchaser shall be obligated to promptly report any failure to conform to this warranty, in writing to the Company in said period, whereupon the Company shall, at its option, correct such nonconformity, by suitable repair to such equipment or, furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labor performed by the Purchaser or others without Company's prior written approval. The effects of corrosion, erosion and normal wear and tear are specifically excluded. Note that this is Ingersoll_Rand standard warranty. Any warranty in force at the time of purchase of the compressor or negotiated as part of the purchase order may take precedence over this warranty.

Fusible Disconnect (Shipped Loose)	Included
------------------------------------	----------

Dual Mounted Filter Option W/9 Valve Bypass	Included
---	----------

1	HE & DP Filters	Included
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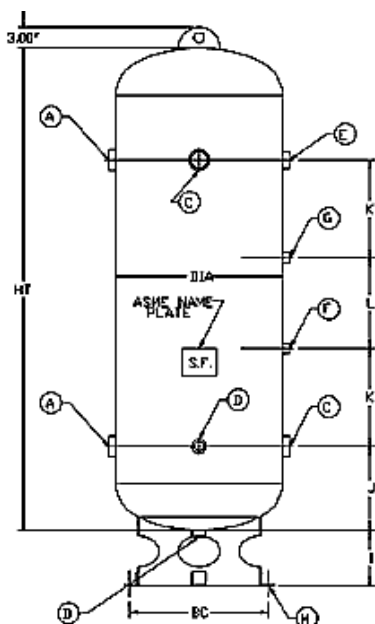
1	IRGP275 General Purpose Coalescing/Particulate Filter	
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GP - General Purpose Filter designed to remove bulk particles (1 micron and larger) and oil (.5 mg/m3) at rated conditions. Primary purpose is to protect down stream filtration and drying equipment from large contaminants.

400 Gallon, 200 Psig Vertical Tank

Detailed Scope of Supply

All amounts are displayed in US dollars



Technical Information:

Size: 400 Gallon

Design Pressure: 200 Psi

Dimensions: (Dia x L) - 36" x 93"

A - 2"

C - 3"

D - 1"

E - 2-1/2"

F - 1/2"

G - 1/4"

I - 8"

J - 16"

K - 20"

L - 20"

M - 11/16"

BC - 32"

<u>QTY</u>	<u>Description</u>	<u>Unit Price</u>	<u>Total Price</u>
1	400 Gallon, 200 Psig Vertical Tank		
1	EDV-2000 Kit, .75" 200PSI @ 457CFM		
	Safety Relief Valve, Pressure Gauge, and EDV-2000 Electronic Drain Valve included		
1	Standard Factory Warranty		Included

400 Gallon, 200 Psig Vertical Tank

The Company warrants that the equipment manufactured by it and delivered hereunder will be free of defects in material and workmanship for a period of twelve months from the date of placing the Equipment in operation or eighteen months from the date of shipment from the factory, whichever shall first occur. The Purchaser shall be obligated to promptly report any failure to conform to this warranty, in writing to the Company in said period, whereupon the Company shall, at its option, correct such nonconformity, by suitable repair to such equipment or, furnish a replacement part F.O.B. point of shipment, provided the Purchaser has stored, installed, maintained and operated such Equipment in accordance with good industry practices and has complied with specific recommendations of the Company. Accessories or equipment furnished by the Company, but manufactured by others, shall carry whatever warranty the manufacturers have conveyed to the Company and which can be passed on to the Purchaser. The Company shall not be liable for any repairs, replacements, or adjustments to the Equipment or any costs of labor performed by the Purchaser or others without Company's prior written approval. The effects of corrosion, erosion and normal wear and tear are specifically excluded. Note that this is Ingersoll_Rand standard warranty. Any warranty in force at the time of purchase of the compressor or negotiated as part of the purchase order may take precedence over this warranty.



Quote Summary

All amounts are displayed in US dollars

Qty	Description	Unit Price	Total Price
2	EPE 50		
1	TZ220 Heatless Desiccant Dryer		
2	400 Gallon, 200 Psig Vertical Tank		

Comments

Certified Drawings (11" X 17") will be \$200 per copy.

Delivery: 4-6 Weeks

Payment Terms: Net 30 Days

FOB: Shipping Point

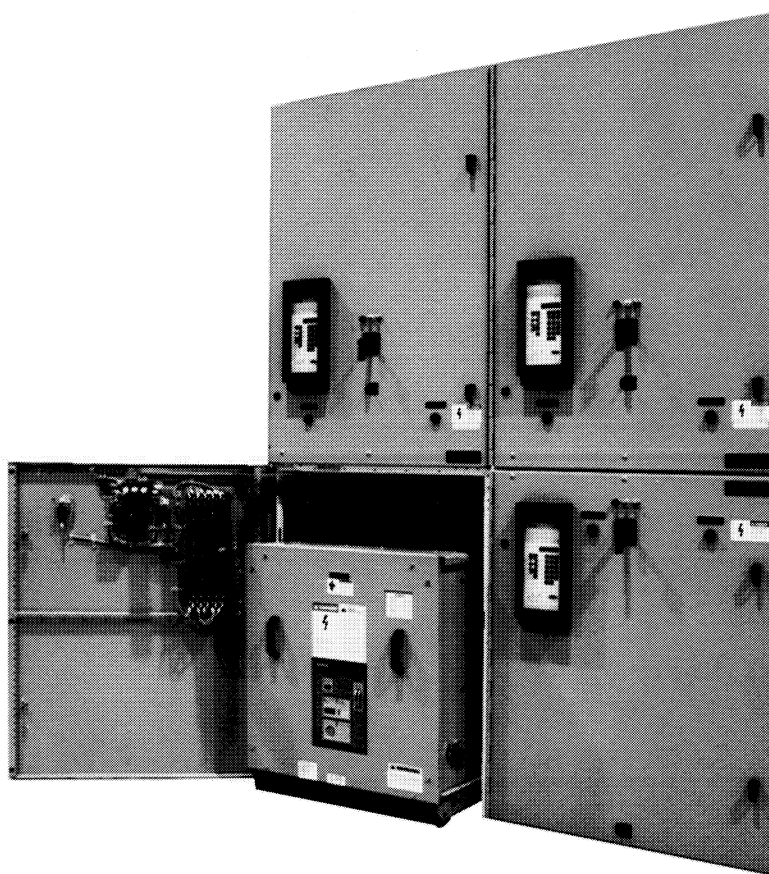
Freight Terms: Prepaid and Add

Pricing and availability are subject to change without notice

Section 12.7.4 13.8 KV Generator Breakers (See Next Pages)

SIEMENS

5 through 15kV — Medium Voltage Switchgear Selection and Application Guide



Contents

Overview.....	1-2
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ISGS™ Relay, Access™ System	7
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Medium Voltage Switchgear — 5 through 15kV Ratings

Technical

Table 3.2 Type GMI Circuit Breaker Ratings

Table 3.2 Type GMI Circuit Breaker Ratings					Circuit Breaker Type					
					5-GMI -250	5-GMI -350	7-GMI -500	15-GMI -500	15-GMI -750	15-GMI -1000
Measured Parameter										
General	Nominal Voltage Class			kV	4.16	4.16	7.2	13.8	13.8	13.8
	Nominal 3-Phase MVA Class ⑤			MVA	250	350	500	500	750	1000
Rated Values	Rated Voltage	Max ②		E kV RMS	4.76	4.76	8.25	15	15	15
		Voltage Range Factor ③		K	1.24	1.19	1.25	1.3	1.3	1.3
	Insulation Levels	Rated Withstand Test Voltage	Low Frequency	kV RMS	19	19	36	36	36	36
			Impulse	kV Crest	60	60	95	95	95	95
	Rated Current	Continuous ④		Amperes	1200 2000	1200 2000 3000	1200 2000 3000	1200 2000	1200 2000 3000	1200 2000 3000
		Short circuit (at rated max. kV) ⑤ ⑥		I kA RMS	29	41	33	18	28	37
		Interrupting Time		Cycles	5	5	5	5	5	5
		Permissible Tripping Delay Y		Sec.	2	2	2	2	2	2
Related Required Capabilities	Current	Rated Max. Voltage Divided by K		E/K kV RMS	3.85	4	6.6	11.5	11.5	11.5
		Max. Sym. Interrupting ⑦	K Times Rated Short Circuit Current KI	kA RMS	36	49	41	23	36	48
				kA RMS	36	49	41	23	36	48
	Closing and Latching (Momentary) ⑧	1.6 K Times Rated Short Circuit Current ⑨		kA RMS	58 & 78 ①	78	66	37 & 58 ①	58 & 77 ①	77
		2.7 K Times Rated Short Circuit Current		kA Crest	97 & 132 ①	132	111	62 & 97 ①	62 & 130 ①	130

① High close and latch (momentary) rating available for special application.

② Maximum voltage for which the breaker is designed and the upper limit for operation.

③ K is the ratio of rated maximum voltage to the lower limit of the range of operating voltage in which the required symmetrical and asymmetrical interrupting capabilities vary in inverse proportion to the operating voltage.

④ 3000 ampere ratings available with increased fan-cooled rating of 4000 amperes. Outdoor requires fans @ 3000 amps. 4000A available in Outdoor.

⑤ To obtain the required symmetrical interrupting capability of a circuit breaker at an operating voltage between 1/K times rated maximum voltage and rated maximum voltage, the following formula shall be used.

$$\text{Required Symmetrical Interrupting Capacity} = \text{Rated Short Circuit Current} \times \frac{\text{Rated Maximum Voltage}}{\text{Operating Voltage}}$$

For operating voltages below 1/K times rated maximum voltage, the required symmetrical interrupting capability of the circuit breaker shall be equal to K times rated short circuit current.

⑥ With the limitations stated in 5.10 of ANSI Standard C37.04-1979, all values apply for polyphase and line-to-line faults.

For single phase-to-ground faults, the specific conditions stated in 5.10.2.3 of ANSI Standard C37.04-1979 apply.

⑦ Current values in this row are not to be exceeded even for voltages below 1/K times rated maximum voltage.

For voltages between rated maximum voltage and 1/K times rated maximum voltage, follow 5 above.

⑧ Current values in this row are independent of operating voltage up to and including rated maximum voltage.

⑨ Included for reference only—not listed in ANSI C37.06.

Table 3.3 Type GMI Circuit Breaker Control Data

Control Voltages, ANSI C37.06 Table 10			Coil Amperes ①		Spring Charging Motor		
Nominal	Range		Close	Trip	Amperes		Charging Seconds
	Close	Trip			Run (Avg.)	Inrush (Peak)	
48 VDC	38–56	28–56	10	10	8.5	15	10
125 VDC	100–140	70–140	4	4	2.7	10.2	8
250 VDC	200–280	140–280	3	3	1.3	2.4	8
120 VAC	104–127	—	4	—	3.3	10.6	8
240 VAC	208–254	—	3	—	1.7	7.1	8

① Current at nominal voltage.

Table 3.4 Interrupting Capacity Auxiliary Switch Contacts

Type Switch	Continuous Current Amperes	Control Circuit Voltage				
		120 AC	240 AC	48 DC	125 DC	250 DC
Breaker	20	20	20	20	10	2
TOC	15	15	10	0.5	0.5	0.2
MOC	20	15	10	10	10	5

Table 3.5 Voltage Transformers

Volt. Class	Ratio	Accuracy Class at 120V Sec.			VA Thermal Rating
		W,X,Y	Z	ZZ	
5kV	2400/120	0.3	1.2	—	500
	4200/120	0.3	1.2	—	500
	4800/120	0.3	1.2	—	500
15kV	7200/120	0.3	0.3	1.2	1000
	8400/120	0.3	0.3	1.2	1000
	12000/120	0.3	0.3	1.2	1000
	14400/120	0.3	0.3	1.2	1000

Table 3.6 Current Transformers ①

Ratio	60 Hz Metering Accuracy at Burden				Relay Class
	B0.1	B0.5	B1.0	B2.0	
Type MD Toroidal Standard Accuracy					
100:5	2.4 ②	—	—	—	C 15
150:5	0.6	2.4	—	—	C 20
200:5	0.6	1.2	—	—	C 25
250:5	0.6	1.2	2.4	—	C 35
300:5	0.6	0.6	1.2	2.4	C 40
400:5	0.3	0.6	1.2	2.4	C 60
500:5	0.3	0.3	0.6	1.2	C 75
600:5 ③	0.3	0.3	0.6	1.2	C100
800:5	0.3	0.3	0.6	0.6	C130
1000:5	0.3	0.3	0.3	0.3	C170
1200:5 ③	0.3	0.3	0.3	0.3	C200
1500:5	0.3	0.3	0.3	0.3	C200
2000:5 ③	0.3	0.3	0.3	0.3	C210
2500:5	0.3	0.3	0.3	0.3	C300
3000:5 ③	0.3	0.3	0.3	0.3	C240
Type MDD Toroidal Special Accuracy					
75:5	2.4 ②	4.8	—	—	C 20
100:5	1.2	2.4	—	—	C 30
150:5	0.6	1.2	2.4	4.8	C 40
200:5	0.6	1.2	1.2	2.4	C 60
250:5	0.3	0.6	1.2	2.4	C 80
300:5	0.3	0.6	0.6	1.2	C100
400:5	0.3	0.3	0.6	0.6	C130
500:5	0.3	0.3	0.3	0.6	C160
600:5 ③	0.3	0.3	0.3	0.3	C210
800:5	0.3	0.3	0.3	0.3	C270
1000:5	0.3	0.3	0.3	0.3	C340
1200:5 ③	0.3	0.3	0.3	0.3	C425
1500:5	0.3	0.3	0.3	0.3	C510
2000:5 ③	0.3	0.3	0.3	0.3	C460
2500:5	0.3	0.3	0.3	0.3	C580
3000:5 ③	0.3	0.3	0.3	0.3	C660

① 1-second through-current and momentary current are equal to the ratings of the associated circuit breakers.

② Exceeds ANSI C37.20.2 Accuracy Limit.

③ Multi-ratio current transformers available. The accuracy ratings shown apply only to the full secondary winding.

Medium Voltage Switchgear — 5 through 15kV

Enclosure Dimensions

Dimensions

Weights and Dimensions are Approximate

Table 3.7 Cubicle Dimensions — Per Vertical Section

Type		Dimensions in Inches (mm)				Weight in lbs. (kg)
		Height	Width	Depth	Drawout Aisle	
Indoor	GM	95.25 (2419)	36.0 (914)	94.0 (2388)	76.0 (1930) Recommended ②	3000 (1364)
Shelter-Clad Single-Aisle	SGM	114.75 (2915)	36.0 (914) ①	173.0 (4394) ③	76.0 (1930) Included	4550 (2069)
Shelter-Clad Common Aisle	SGM	114.75 (2915)	36.0 (914) ①	264.0 (6706) ③	76.0 (1930) Included	8100 (3683)
Aisle-Less Non-Walk-In	OGM	113.62 (2886)	36.0 (914)	94.0 (2388) ③	76.0 (1930) Recommended ②	3600 (1637)

Table 3.8 GMI Circuit Breaker Weights in lbs. (kg)

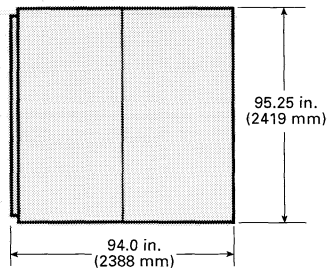
Cont. Current Amps	Circuit Breaker Type					
	5-GMI -250	5-GMI -350	7-GMI -500	15-GMI -500	15-GMI -750	15-GMI -1000
1200	385 (175)	440 (200)	425 (193)	415 (189)	425 (193)	440 (200)
2000	425 (193)	480 (218)	465 (211)	455 (207)	465 (211)	480 (218)
3000	—	575 (261)	560 (255)	—	560 (255)	575 (261)

① Add 6 in. (152 mm) to each end of linup for aisle extension 12.0 in. (305 mm) total)

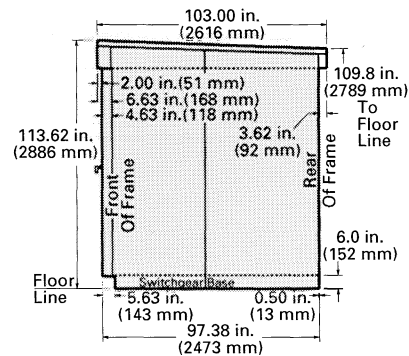
② 76 in. (1930 mm) aisle space recommended allows room for interchange of breakers. Minimum aisle space required for handling circuit breaker with lift truck is 61 in. (1549 mm). Minimum aisle space required if all breakers are at floor level is 50 in. (1270 mm)

③ Add for roof overhang
Rear (Cable Side)
Front

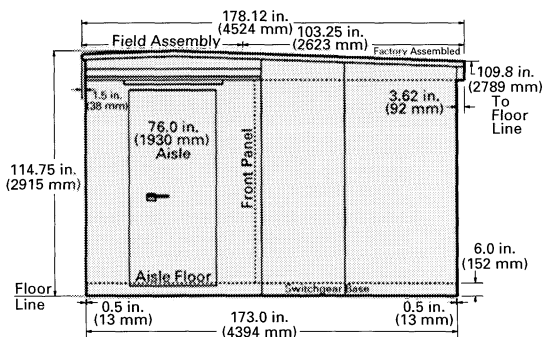
Non-Walk-In	Shelter Clad
3.62 (92 mm)	3.62 in. (92mm)
5.37 (136 mm)	1.5 in. (38 mm)



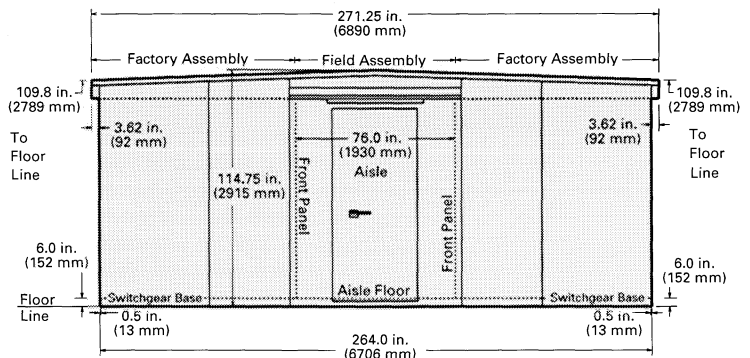
End View of Type GM Indoor Switchgear



End View of Non-Walk-In Type OGM Outdoor Switchgear



End View of Single Aisle Type SGM Outdoor Switchgear



End View of Common Aisle Type SGM Outdoor Switchgear

Section 12.7.5 Plant DCS System (By ProEnergy EPC)