Brand New Caterpillar Gen Sets Model 3512c Engines With Power Supply 600 Volts / 60hz

Description:

- Skid Mounted With Top Cover
- SR4B 1750 KVA Generator-Two Bearing
- 1225 KW,867 Frame
- 7 PF 600 Volt Complete With Stator Rtds
- Space Heater
- Bus Bar And Cable Access Box
- Tier II, 2006 Non Road Emission Certified
- Direct Injected, Turbochargers
- After Cooled-DITA
- Separate Circuit After Cooled
- Optimized For Low Emissions. Engine Rating = (1476hp @ 1200 RPM)

SCR SYSTEM GENERAL SPECS. Made by: IEC SYSTEMS, LLC

S.C.R. DRIVE SYSTEM AND GENERATOR CONTROLS :

The Drive System will provided control and power the following:

3 A/C Engine/Generator sets 600Volt, 3PH, 1350Kw 1500KVA

One 1000 HP draw works, driven by 2 x 500 HP Series DC motors.

One rotary table driven Independent (500HP Series)

2 x 1000HP mud pumps, driven by 2 x 500 HP Series DC motors.

I. The complete system will consist of the following equipment:

A. One (1) **"I-DRIVE" S.C.R. System** as follows:

4 - Model 1500 I-DRIVE SCR Drive Cubicle(s)

1 - Interface/Service Cubicle for the SCR System

1 - Auxiliary Service Cubicle to support the SCR system motor starters (oilers, blowers, & etc.)

1 - Driller's Console

1 - Drillers Foot throttle

One (1) **I-DRIVE Engine/generator Power Control System** for Cat 3512 power units as follows:

3 - Generator Control Cubicle(s)

1 - AC Generator Synchronizing Cubicle

A/C Motor Control Center 480VAC, 3ph, 60 Hz with A/C motor control and feeder breakers.

One Low Voltage Distribution and Lighting Distribution Panel with 3 pole, 2 pole or 1-pole breakers as required.

Power Control Room outdoor, weatherproof, insulated, mobile steel building with a self-supporting oil field skid. It will contain the above wired and tested equipment.

Mounted on the skid or on the outside of the control room is the following:

2 - Two porch mounted air conditioning condensing units located on porch, 7.5 ton each with air handlers mounted internal to house

1 - 1000kva Power Transformer

1 - 75 kva Lighting Transformer

1 - Dynamic Breaker Resistor

Detailed Systems Specifications:

I-Drive SCR Drive System.

The complete system will be designed to NEMA, IEEE, ANSI, and NEC and standards for use on a land type-drilling rig.

The System will consist of 4 Model No. 1500 SCR drives. The specifications of each I-Drive model No. 1500 SCR cabinet is as follows:

One isolated full wave, full control, three phase, forced air-cooled SCR bridge with input/output ratings as follows:

Input Voltage 600VAC 3 phase, 60 Hz

Output Voltage 750 VDC
Continuous AMPS 1500
Intermittent AMPS 1800

Efficiency – 98 % at full output

Operating temperature range: -20 degree C to +50 degree C (-4 degree F to +122 degree F)

Storage temperature range: -38 degree C to +50 degree C (-36 degree F to +122 degree F)

* **Each SCR Converter section will contain:**

1 Full wave, full control, SCR bridge
1 DC control electronics with self-diagnostics feature and local speed potentiometer
1 Main Circuit Breaker, manually operated, molded case, with undervoltage release, bolt-in construction.
3 Individual SCR cell fuses for proper fuse/SCR coordination
1 DC Voltmeter, 250 degree scale
1 DC Ammeter, 250 degree scale

* Each SCR converter is to have four (4) adjustable current limits with automatic switching as load assignments change.

A main AC copper bus will extend continuously through all cubicles which will be rated the same as the main AC bus in generator control switchboard.

The DC Switchgear will consist of all the necessary DC contactors and DC output bus necessary for customer connection to the SCR drive system.

* KW/KVA limiting circuitry monitors the available power and compares it against the KW/KVA in use, so that the power consumed by the SCR system does not exceed the available power on the line.

A surge protection panel will be provided, complete with feeder breaker and high capacity metaloxide varistors. Circuit breaker will have an auxiliary contact that will be used to illuminate an indicating light

There will be a % DC Ground Detection Meter provided to constantly monitor DC ground isolation

* Control power will be 120 VAC for best contact integrity and line noise immunity. The system will be provided with a control power transformer to provide control for standard contactor logic and alarm function. Each SCR converter section will be assignable to two (2) loads. Assignment switching will provide 100% redundancy in case of converter or load failure.

Converter load assignment will be interlocked so that switching will be done only at zero current for longer contact life.

All logic functions will be provided according to customer specifications and necessary

safety functions. There will be two (2) SPST load interrupting main contactors for each assignment.

* Dynamic Braking

Motor braking will be resistive loading to prevent possible generator overspeed under light loading conditions. Full control will be maintained to protect against impact shock to the driven equipment.

* **Safety and protection** features:
DV/DT surge protection
Bridge over temperature detection
Rectification air loss detection via overtemp
Blown fuse bridge shutdown
Current limiting, four (4) adjustable for assignable loads
Fast acting properly sized fuses for SCR bridge protection
Provision for lock-out switches for MP, D/W and RT.

* **Standard** features:
One Circuit breaker switch 1200 AMP stationary type, with under voltage trip, aux. contacts (4), manual charge, manual close.
Voltmeter 0-1000V DC
Ammeter 0-1500A DC
Assignment contactors two per load, properly sized with copper bus bars for output
Assignments, up to four (4) alternate assignments per bay (two with reversing)
Single or two motor operation from one bay
Dynamic braking with resistors and contactors

* **I-DRIVE SCR design features:**
Heat sinks of extruded, anodized aluminum
Control voltage is 120 VAC with transient protection
KW/KVA current limiting for the total rig power supply

I-Drive Electronic DC control module plugs into DC cardrack mounted behind protective door Continuous main AC bus compatibility sized with AC power available
Front accessible cabinet for all components SCR (DC) Cardrack/DC module/test panel features:

SCR (DC) CARDRACK (DC) MODULE/TEST PANEL FEATURES:

I-Drive SCR Control Module: The control module contains the firing circuit for Three Phase Full Wave SCR Bridge.

The I-Drive control module has voltage; speed or torque regulators built-in with integrator and proportional control loops.

There is no calibration of I-Drive control module for adjustment of the throttle or current limits.

All I- Drive electronics designed for 50 degree C ambient temperature operation.

The I- Drive module is a standard unit; interchangeable on any system, on shore/off-shore, single motor, two motor operation and series or shunt motors.

The I- Drive DC cardrack has switch selected meter inputs for monitoring critical module parameters.

7) The I- Drive SCR control module plugs into the DC cardrack (no possibility of miss-wiring when replacing the module).

I – Drive Current limit settings for different assignments are set on the test panel and are separate from the control module. This allows the I-Drive Current limit calibration setting to remain when the SCR control module has to be changed.

FEATURES:

The following are main features of the I-DRIVE SCR Control System:

Voltage, current or speed feedback control to maintain constant speed of DC motor for all loading.
2) Capable of accepting up to four assignments, each with its own C.L. current limits
3) Speed control for shunt or series DC motors
4) Load sharing for two motors in parallel
5) Generates a calculated speed signal for speed control of series motors
6) Capable of load sharing with other I-DRIVE SCR bays
7) Power limiting signal from generator control
8) Safety features for proper SCR drive operation
9) SCR control module easily removed by qualified technicians by plug in vibration resistant connectors.
10) No field calibrations
11) I*Ra compensation
12) Voltage and current outputs for metering
13) Alarm indications for SCR overtemperature and blown fuse
14) Automatic bridge shutdown for blown fuse condition

LOAD SHARING MODE

When necessary to parallel two SCR's to provide more power to a single load, the I-Drive control modules allow load sharing between two SCR drives.

POWER LIMITING FROM GENERATOR CONTROL:

I-Drive Power Limiting protects the diesel engine/generator set(s) from dropping "Off Line" due to an overloading. When maximum kW or KVA capacity has been reached, the system "phases back" the outputs of the SCR drives connected to the AC Buss, preventing the generator set(s) from dropping off line due to an overload.

CURRENT LIMIT CIRCUIT:

The I-Drive SCR Control Module accepts four different current limit settings, which corresponds to the four possible assignments of the SCR drive. The I-Drive SCR DC

cardrack test panel has four potentiometers where the Current Limits are set. The current limit settings are a separate module from the D/C module which allows changing the D/C module without resetting current limits.

REMOTE CURRENT LIMIT:

The I-Drive SCR Control Module allows for a remote current limit input. This setting is used with the current limit setting of a Top Drive or the Rotary Table.

FIRING CIRCUIT REGULATOR:

The I-Drive Firing Circuit Regulator works in conjunction with the AC Buss Phase Sensing and the Six Gating Pulse circuits. The SCR firing pulses are referenced to the Three AC Lines, and timed to trigger the respective SCR's at the correct instant.

There are six firing pulses (each spaced 60 degrees from the previous) in each cycle and all are adjusted simultaneously by the firing enable circuit to get the correct SCR firing angle.

INVERSE TIMED OVERCURRENT Module: (plugs into the DC cardrack)

This feature allows the I-Drive SCR drive to deliver more current for a short period of time than what is preset with the current limit Calibration as set on the DC cardrack test panel. This feature can be used in situations where high current is needed for short periods of time, I.E. for a drawworks motor. The amount of overcurrent allowed is set at the Timed-Overcurrent Module, from 110% to 130% of the present current limit for approximately 60 seconds. After the 60 seconds period, the current will revert to the normal current limit as set at on the I-Drive DC cardrack test panel so as not to damage or overheat the SCR bridge.

ALARMS:

There are two alarms in the I-Drive SCR drive that are monitored, they are:
1.) Overtemperature
2) Blown Fuse

The I-Drive SCR Bridge has the capability of detecting:

Overtemperature: When the SCR Blower is lost or the SCR house internal ambient temperature rises to an unacceptable level so that proper cooling of the SCR's is not possible, a set of thermoswitches, mounted on the SCR bridge heatsinks detect when the
temperature goes above 70 degrees C and signals an alarm condition (isolated contact closure)

Blown Fuse: The SCR bridge has a set of semiconductor fuses for the protection of the SCR's. If any of the fuses open, the FFAS (fuse failure alarm signal) is activated (isolated contact closure) and the firing pulses to the SCR bridge are automatically inhibited

Zero Throttle Interlock:

All the controls are **electronically** interlocked. If the bay is re-assigned during power on, the bays shut down and will not restart until their respective throttles have been returned to the ZERO (off) position. This includes the foot throttle.

SCR DRIVE CONSTRUCTION SPECIFICATIONS:

The I-Drive SCR drive is of modular design, compact, Nema type 1 A construction, front access only. The D.C. control module contains the circuitry necessary to control the SCR bridge's output. The module is interchangeable between all I-Drive SCR systems. The module is furnished with no adjustments necessary. The module is easily disconnected for replacement should the need arise. This makes for a minimum of "down time" should a failure occur.

The I-Drive SCR cabinet is so designed so as not to have any pockets of abnormally high temperature.

The I-Drive SCR Bay cooling is assisted by a squirrel cage blower forcing air in the direction from bottom to top of the cabinet. Air is drawn in through a filter in the lower section of the front door. It then proceeds over the contactors, DC buss, and into the blower intake. The blower's output airflow goes directly into the plenum below the SCR bridge, into the bridge
heat sinks (the point of the most air flow resistance), out the top of the bridge, upward past the
circuit breaker and AC buss, and out the top of the cabinet.

The I-Drive SCR bridge is composed of three (3) identical and interchangeable modules (Phase Cells). Each Phase Cell has an AC input flag, a minus DC output flag, and a plus DC output
flag. In the Phase Cells the discrete SCR devices have heatsinks on **both** sides. Thermodynamics proves that this allows the SCR devices to operate at a lower temperature than single sided "bricks" for the same device current. The lower the operating temperature, the
more reliable the SCR device is. The system is designed for low maintenance and to operate in ambient air temperature up to 50 degrees C without air conditioning.

DYNAMIC BRAKE:

The I-Drive drawworks dynamic brake will slow the drawworks motors from full speed within eight to ten seconds after the foot throttle is released. The power of the free wheeling motor is fed back into a resistor bank. During normal operation the dynamic brake system is non-operative, and the drawworks is either OFF or operating at the desired cathead speed. If however, at any time the motor speed is higher than the DW throttle speed setting, and the foot
throttle is OFF, the dynamic brake system is actuated, reducing the motor speed to the DW throttle setting.

DRILLERS FOOT THROTTLE:

The I-Drive foot throttle is constructed of rugged stainless steel throughout; built to withstand the environment normally encountered on the rig floor.

(((The foot throttle is a compact unit constructed of stainless steel. The unit is designed for Air purging for use in a Class 1, Division 2 area.)))

DRILLERS CONSOLE:

The I-Drive Drillers Console will be NEMA type 4X construction of #316 stainless steel[1] outdoor weather proof and provided with air purge/pressurization fittings to allow use in a Class 1, Division 2 hazardous area. All assignment switches, hand throttles and controls will be front mounted on the door. All meters, instruments and annunciators will be mounted behind the front door with a safety glass view window provided to view the meters and instruments, etc. The door will be attached with stainless steel hinges and positive latching stainless steel latches.

The door will be fully gasketed to prevent the entrance of moisture and to prevent air leakage to the atmosphere and to maintain a positive internal pressure of a minimum of .1 inch of water.

(((All Control Connectors required will be mounted on the bottom of the enclosure and to be
Eagle Talon 2 Series.)))

All internal wiring and control receptacle wiring will be to terminal blocks. The I-Drive drillers console will contain the following:

Hand throttle for mud pump speed control (one each pump)
Hand throttle for drawworks speed control
Hand throttle for rotary table speed control (independent R/T drive only)
SCR Emergency shutdown push button
SCR assignment switch
Drawworks forward - reverse switch
Rotary table select switch(if TD equipped)
Rotary table/ Top drive Forward - Reverse switch (independent R/T and T/D only)
Rotary table/Top Drive ammeter/ torque meter (independent R/T and T/D only)
Rotary table/Top Drive torque control
SCR cubicle ON lamps, amber (one per SCR bay)
Generator ON lamps, green (one per generator)
Mud pump blower ON lamps, clear
Drawworks blower ON lamps, clear
Rotary table blower ON lamps (independent R/T drive only), clear
Power limit lamp, red
Power indicating meter
Auxiliary motors ON light (one per function), clear
Alarm status indicator lights (one per function) blinks respective “on” lamp
Alarm annunciator Acknowledge on/off switch

Control Voltage on, green
System Alarm, red

Purge loss alarm, red

B. "I-DRIVE" Generator Control System

One set of I-Drive generator cubicles consisting of 3 each
I DRIVE model 1600 engine/generator control modules, breakers and related equipment for the control of 3 each, 600 VAC, 3P 60 Hz Cat 3512 engine/generator sets and a synchronizing and ground detection cubicle.

Each I-Drive Engine/Generator Control cubicle shall include:

(The IEC, I-DRIVE Engine/Generator A/C Control cubicle contains a Circuit Breaker section, an AC electronic control section, and an AC Support section.)

CIRCUIT BREAKER SECTION:

One 1600 AMP frame Circuit Breaker of stationary type, insulated case, manually charged, electrically operated, with the following features:

65 KA RMS Sym. Interrupting Capacity. 100% rated, designed for zero maintenance. Solid state protection and control, long time, short time and instantaneous trip settings, under voltage trip, and auxiliary contacts.
One lot of solid copper properly sized and braced full-length horizontal bus bar with silver-plated connections.

INSTRUMENTS AND CONTROLS

1 – A/C Ammeter switchboard type 1 % accuracy properly scaled

1 – A/C Voltmeter switchboard type 1 % accuracy properly scaled

1 – Kilowatt Meter switchboard type 1 % accuracy properly scaled

1 - Kilovar Meter switchboard type 1 % accuracy properly scaled

1 – Generator "online" indicating lamp

1 – Lot current and potential transformers

IEC INC. I-Drive AC ELECTRONIC CONTROL SECTION:

The IEC Inc. I-Drive AC Electronic Control Section contains the AC cardrack. Three modules plug into the AC cardrack. They are the IEC Inc. Engine Electronic Governor module, the IEC Inc. Generator Electronic Voltage Regulator module and the IEC Inc. Metering control module. All external connections to the AC cardrack are by barrier strip (screw type).

The I-Drive A/C Controls will contain the following features:

AC Alarm Circuitry for all associated protective needs

Reverse power trip

Overload alarms

Electronic governor

Voltage regulator

KW/KVA load sharing

Voltage adjust rheostat

Engine control switch: off-idle-run-load

Fault indicators

Engine run L.E.D.

Breaker close verification

Under frequency alarm/trip

Over frequency alarm/trip

Under voltage alarm/trip

Over voltage alarm/trip

KW/KVA power limit

Reverse sequence detection

Speed adjust rheostat

Each IEC/I-Drive Governor control is independent to provide maximum independent reliability; NO master/slave control is utilized.

IEC INC. METERING MODULE:

The IEC Inc. metering module provides the following features and functions:

AC Voltmeter drive (full scale 1% accuracy)

AC Ammeter drive (full scale 1% accuracy)

Kilowatt meter drive (full scale 2 % accuracy)

Kilovar meter drive (full scale 2 % accuracy)

Frequency meter driver

Power Factor meter driver

Generator "on line" (CB closed) indicator

AC phase ammeter switch

AC phase voltmeter switch

Latching Over Voltage alarm indicator

Latching Under Voltage alarm indicator

Latching Over Frequency alarm indicator

Latching Under Frequency alarm indicator

OV, UV, OF, and UF shutdown drivers

Reverse Power shutdown driver

Latching Reverse Power alarm indicator

Alarm reset button

I-DRIVE GOVERNOR CONTROL MODULE:

The IEC I-Drive Inc. Governor module provides the following features and functions:

Generator run indicator

Engine off, idle, run, load switch

Speed adjust Rheostat

Speed regulation ± 01% no load to full load steady state and ± 1% transient loads.

Dynamic KW load sharing - each regulator is independent and automatically shares when placed “on line” KW sharing can be set to track within 2% of rated KW of generator.

Droop load sharing optional

Response time 0.4 to 1.2 seconds, depending upon engine type and fuel used.

Load sharing response and steady state regulation within ± 3% of the proportion load sharing from no load to full load.
Engine speed ramp typically 7 seconds from idle to run service.

Auto-synchronizing provision.

Provisions for manual governor control under emergency conditions.

One set of Hands-Off Cranking batteries for cold start consisting of gel cell batteries and electronically regulated battery charger.

IEC INC. VOLTAGE REGULATOR MODULE:

The I-Drive voltage regulator module features:

Load regulation ± 1% maximum from no load to full load

Voltage adjust Rheostat

Response time less than 0.8 seconds

Output rating of 63 VDC @ 10 AMPS or 125 VDC @ 10 AMPS
Dynamic KVAR sharing - each regulator is independent and automatically shares when placed "on line" KVAR sharing can be set to track within 2% of rated KVAR of generator.

KVAR sharing during transient loads will not exceed 5% of rated.

HANDS – OFF CRANKING –CONTROL

The HOCC System will supply power for the engine starting circuit and the pulse pick-up circuit in each generator control module. The system/operation will consist of the following.

1 – Set of Hands off cranking batteries consisting of gell cell batteries and electronically regulated battery chargers to provide cold start power for engine controls.

–Engine control power supply (each generator control section) to provide engine control power to each engine. Upon initial start up (cold) the batteries will supply cold power to the engine controls to allow engine starting. After the generators are online, the engine control power supply will provide control power for continuous operation. After the engine control power supply is activated, the will drop out and revert to stand-by power in case of primary power supply failure.

IEC INC. AC SUPPORT SECTION:

The IEC Inc. AC support section contains the circuitry that interfaces with the AC electronic control section and the engine/generator. Located here are the P.W.M. Exciter Power Supply with power transformer for the generator exciter, the metering interface panel, and the necessary PT's & CT's.

IEC SYNCHRONIZING AND GROUND DETECTION CUBICLE:

The I-Drive Synchronizing and Ground Detection Section for full parallel operation of the A/C generator system to consist of the following:

2 - Synchronizing Lamps

1 - Synchroscope

1 - Synchronizing Switch

1 - Synchronizing Check Relay
1 - Frequency Meter

1 - Volt Meter

1 - "% D/C Ground" Detection meter

1 - Set A/C Ground Detection Lamps, with test button

1 - Generator Selector Switch

2 - Bus PT's

2 - Batteries with their charger.

1 - % Power Phase back driver assembly

IIEC 600V FEEDER BREAKER DISTRIBUTION

The following 600V Distribution breakers will be located in the main 600V, A/C line-up.

Each - Main feeder breakers to feed power to one (1) 1000 KVA 600/480V power transformers.

C. INTERNATIONAL ELECTRIC CO. A/C MOTOR CONTROL CENTER

A/C Motor Control Center 480VAC, 3P, 60 Hz and Feeder Breakers consist of:

One IEC Inc. A/C Motor Control Center to be Nema Type lA Construction, front access only with horizontal and vertical solid copper bus. Motor starters to be motor starter/circuit breaker combination type full voltage, non-reversing with 3 pole overload blocks, overload heaters, control power transformer, fuses, operating handle, start/stop push button (or H-O-A Control) in door and red "run" indicating lights. The following starters and feeder circuit breakers are included.

ITEM #2: 480V MCC Function Listing
All starters necessary are included. At this time MCC functions are based on A/C motors utilized.

Add (1) one –480V Gen. breaker to power engine block/oil heaters, space heaters etc., A/C

ITEM #	Qty	Type
1	7	S/4 for 50HP Desand, Desilt, MP1 2 Superchargers, Mud Mixers 1 & and 1 Spare
2	2	S/3 for 30HP Trip Tank Pump and 1 spare 30HP
3	5	S/2 for 20 HP brake water cooling #1 & #2, Driller Water 1 & 2, and

		1 Spare
4	12	S/1 for 10HP DWA/B Blowers, MP1 A & B Blowers, MP2 A & B Blowers, Rotary Blower, 2-spare 10HP, 3HP DW Oiler, MP 1 & MP2 Liner Wash
5	3	100 AT C/B for Lighting transfer, spares #1 & #2
6	1	50 AT C/B Elmagco brake
7	2	150 AT 3 P C/B- for Camp Transfer and 100HP HPU
8	2	90AT for air compressors #1 & #2
9	6	60AT for SCR House , Air Conditioners #1 & #2, BOP, Suction Tank Agitators #3-5 and 2 spares
10	2	40AT for Shaker Tanks Agitators #1 & #2 and spare
11	6	30AT for wire line, Mix House heater, Dog House heater, BOP House heater, and 2 spares
12	4	15AT for Shakers #1 & #2, Fuel Transfer #1/#2 and Degasser

LOW VOLTAGE DISTRIBUTION AND LIGHTING FEEDERS:

IEC Nema type IA enclosure with 3 pole, 2 pole or single pole breakers for the following:

1 - 100A, 3p breaker for rig floor lighting panel
1 - 100A, 2p breaker for Boiler
10 - 20A, 1P, C/B for MP1 Space Heaters, DWA/B and RT Heaters, Gens 1-3 Heater/Lighting, Shakers/Suction Tank Steam Heater Blowers, MP1 & 2 Steam Heater Blowers, SCR House Receptacles, SCR House Lighting and Battery Chargers
3 - 30A, 3P C/B for spares
10 - 20A, 1P, C/B for lighting circuits
2 - 60A, 3p C/B for spare and Change House Heater

IEC POWER/LIGHTING TRANSFORMERS:

1 Each 1000 KVA, 600 V 3ph Delta primary 600 VAC, 3ph wye secondary 50/60 Hz aluminum wound$_1$ IEC Nema 3 outdoor enclosure dry type. To provide MCC/power distribution voltage.

1 Each 75 KVA, 600 VAC, 3 PH primary 120/208 VAC, wye secondary 50/60 Hz aluminum wound IEC Nema 3 enclosure dry type, to provide lighting/low voltage power.

D. IEC - POWER CONTROL ROOM:

1 Each IEC Power and Control Room with the above equipment mounted wired and tested to be of the following construction:

International Electric Co. Power Control Room will be designed for transport by an oifield trailer and for being lifted by an oifield tandem truck outfitted with an end roller. The skid base will be constructed from wide flange structural steel sections, acting as skid runners. Each end of the skid will be outfitted with a loading pipe end to facilitate loading. Top lifting provisions can be provided as optional equipment.

The columns and ceiling framing will be constructed from structural steel. The outside steel sheeting will be fabricated from sheet steel, min. 12 ga.

The walls and roof sheeting sections will be welded together. The floor will be fabricated from three sixteenth inch thick smooth steel plate. The inside surface of the walls will be finished with a sandwich style insulating board, three eights inch thick with white pebble coating in the interior. The ceiling will be formed from inverted Tee-Bar and lay-in insulated ceiling board.

The IEC Power Control Room is an outdoor, weatherproof, mobile steel building with a self-supporting oil field skid. The structure has the following features:

- Two industrial steel doors on sides with "Anti-Panic" handle for quick easy opening. Doors open outward. Doors can be locked from the outside but can be opened from the inside even when locked.
- All external connections will be wired to plug-in connectors accessible from outside the building.
- Aisles will have a rubber neoprene mat, full length of the aisles.
- Walls are insulated with polystyrene block material. Minimum R-19 energy rating.
- The PCR will be primed and finish painted inside and out.

Lighting:

Standard 48-inch fluorescent lights, a battery operated emergency light activated by loss of power on generator main bus, and convenience outlets for customer use will be provided.

Air Conditioning Units:

2 – 7.5-ton air-conditioning units with porch mounted condensing units (480V) & indoor mounted air handlers (208 V) that will maintain the inside temperature within the design limits of the installed electrical equipment are included. The air conditioning will be supplied by a total of two units. Either unit will maintain operating temperature limits with one for a back up. These air conditioning units will be fed from the A/C MCC.

P1ug Panels:

IEC AC Generator power and control plugs are sidewall mounted and recessed in the wall. Generator power cable entry shall be buss stabs, controls, etc. shall be plug/receptacles.
IEC Drilling Motors and AC plugs/Buss are end wall mounted in a separate plug compartment and will be recessed to minimize possible damage during moves. The connectors will slope down in a stair step design to receive stress on the cables. The compartment will have double lockable doors to protect the connectors. All A/C motor power control and lighting connectors will be IEC, SPJ type, Nema 4X rated.

IEC Motor Control Center feeder transformer(s) are mounted on a covered porch on the PCR base at one end outside of the air-conditioned space. Lighting transformers are mounted on the covered porch.

The following equipment will be IEC factory installed, wired and tested:

A. I-Drive AC Generator Control
B. I- Drive S.C.R. Drilling Control System
C. Motor Control Center
D. Low Voltage Distribution Panel
E. Transformers
F. Plug Panels and Connectors
G. Interior Lighting
H. Air Conditioning Equipment

The exterior of the building will be cleaned with a sweep blast of sand to remove scale and oxidation. The exterior coating will consist of a subcoat of zinc rich primer, and covered with a coat of polyurethane, color white. The interior floor of the building will be covered with a black colored epoxy enamel. The skid base will be primed and painted black.

The transformers, air conditioning units and dynamic brake grid resistors will be mounted at the end of the building opposite the receptacle/plug end.