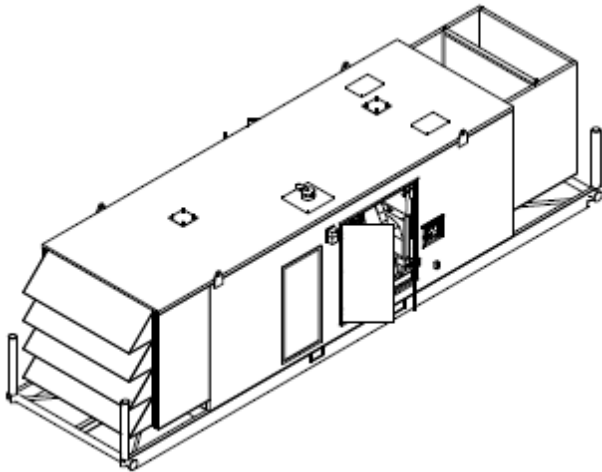


CPR001-XGF400 GAS RENTAL



CONTINUOUS 400EKW

Frequency	60 Hz
kVA Rating	500 kVA
Rated Power Factor	0.8 pf
Voltage	480 V

FEATURES

Product Design

- Fuel flexibility enables operation on a wide range of gas quality – from wellhead gas to pipeline quality natural gas
- Engine ratings developed to accept low-quality gas down to Cat MN 30
- Oversized SR4B generator optimized for block load acceptance and motor starting applications
- Package design and fuel flexibility allow minimum site preparation and low installation cost
- Heavy-duty base with tow bars and forklift pockets ideal for loading, transport, and unloading operations
- Open-skid configuration designed to integrate drop-over enclosure
- 4-point lifting structure

Superior Performance

- Superior gas engine transient capability
 - 50% G1 ISO 8528 load step
 - 30% G2 ISO 8528 load step
- Heavy-duty stacked core cooling system with low power draw and high ambient capability

Emissions Compliance

- Meets most worldwide emissions requirements down to 204 mg/Nm³ NO_x level without after treatment.
- 0.5 g NSPS site compliance with stationary application capability in non-attainment areas
- Includes factory-installed air-fuel ratio control and three-way catalyst

Durability

- Tough and durable, built specifically for conditions in the oilfield
- Rugged design optimized for harsh oilfield environments

Latest Electronics

- ADEM™ A4 control system provides integrated ignition, speed control, and protection
- Latest EMCP 4.3 controls for integrated engine generator control, enhanced functionality, and simplified operator interface
- AGC-4 provides paralleling, load sharing and primary generator protective.

Custom Packaging

For any petroleum application, trust Caterpillar to meet your project needs with custom factory generator sets and mechanical packages. Cat® engines, generators, controls, radiators, and transmissions can be custom designed and matched in collaboration with our local dealers to create unique solutions. Custom packages are globally supported and are covered by a one-year warranty after startup.

Testing

- Every Cat generator set is full-load tested to ensure proper engine performance
- Generator sets are assembled, tested, and validated as a package to ensure performance, reliability and durability

Product support

More than 2,200 dealer outlets
 Cat factory-trained dealer technicians service every aspect of your petroleum engine
 Caterpillar parts and labor warranty
 Preventive maintenance agreements available for repair before- failure options
 S•O•S_{SM} program matches your oil and coolant samples against Caterpillar set standards to determine:

- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

CPR001-XGF400 GAS RENTAL

CONFIGURATION

Air Inlet System

Air cleaner - intermediate duty, dry
Air cleaner rain cap
Air cleaner service Indicator

Cooling System

High ambient radiator design for gas fuel applications
Stacked aftercooler and jacket water cores
Metal top and bottom tanks
Coolant drain
Fan and belt pulley guard
Coolant level sensor

Exhaust System

Exhaust manifolds – water cooled
Exhaust elbow and flex fitting – 127 mm (5 in)
Residential grade muffler
Three-way catalyst
Muffler mounting structure

Fuel System

Gas pressure regulator – requires 10.3-34.5 kPa (1.5-5 psi) gas
2" ANSI flange customer fuel connection
Natural gas carburetor
Air-fuel ratio control

Generator

Rated for continuous duty – oversized 10%
Class H insulation
Permanent magnet
Random wound
240 VAC space heater
Coastal insulation protection
IP23 protection
Cat Digital Voltage Regulator

Control System

Electronic governing ADEM A4
Electronic diagnostics and fault logging
Momentary start/stop logic
High temp braided engine harness with 70-pin customer connector and service tool connector

Lube System

Crankcase breather, top-mounted
Oil filter, spin-on, left-hand service
Dipstick, left-hand service
Oil pump – gear-driven
Oil cooler

Mounting System

Heavy-duty welded steel base designed for the oilfield
Base design optimized for loading and unloading
- Forklift pockets
- Tow bars – fore and aft
- Four-point lift from tow bars

Protection System

The following parameters include alarm and shutdown:
- Inlet manifold air temperature
- Inlet manifold air pressure
- Oil pressure
- Oil temperature
- Coolant temperature
- Engine overspeed
- Battery voltage

General

- Jacket water heater
- 24V starting motor
- 24V, 60-amp charging alternator
- 100 A, 240 VAC manual transfer switch for external shore power supply. Shore power a connection via a 3-pole power distribution block; capable of accepting conductors in the range of # 2/0 AWG to #14 AWG.

Quality

- Factory testing of standard generator set and complete power module
- UL, NEMA, ISO and IEEE standards
- O&M manuals

CPR001-XGF400 GAS RENTAL

Space heater	Standard
Generator set control	EMCP 4.3

Specification

Generator (SR4B)

Frame size	593
Voltage	480 V
Design KVA rating	680 kVA
Insulation class	UL 1446 Class H
Temperature rise (40°C ambient temp.)	80 °C
Overload	300%/10 sec
Coastal protection	Included
Excitation	PM
Number of poles	4
Winding	Random wound
Pitch	0.7333
Number of leads	6
Number of bearings	1
Ingress protection (IP) rating	23
Alignment	Close coupled

Engine (V12, 4-Stroke-Cycle)

Bore	137 mm
Stroke	164 mm
Displacement	29 L
Aspiration	Turbocharged-Aftercooled
Engine ignition and control	Electronic ADEM A4
Compression Ratio	8.3:1
Engine speed	1800 rpm
Aftercooler water inlet	54 °C
Jacket water outlet	99 °C
Exhaust Manifold	WC
Fuel methane number	85
Lube oil system capacity	170 L
Engine coolant capacity	55.5 L
Radiator coolant capacity (JW)	144 L
Radiator coolant capacity (AC)	144 L
Fuel	Natural Gas
Fuel pressure range	10-34 kPag
Altitude capability At 36° C inlet air Temp.	1524 m
Fuel system	LPG IMPCO with air fuel ratio control

Technical data

ENGINE DATA	Unit	100% load	75% load	50% load
ENGINE POWER (WITHOUT FAN)	bkW	448	336	224
ENGINE EFFICIENCY (ISO 3046/1)	%	34.4	32.8	29.8
FUEL CONSUMPTION (ISO 3046/1)	MJ/bkW-hr	10.47	10.98	12.08
AIR FLOW	kg/bkW-hr	3.60	3.80	4.19
COMPRESSOR OUT PRESSURE	kPa(abs)	207	196	166
COMPRESSOR OUT TEMPERATURE	°C	121	119	99
AFTERCOOLER AIR OUT TEMPERATURE	°C	57	56	55
INLET MAN. PRESSURE	kPa(abs)	200	162	121
INLET MAN. TEMPERATURE (MEASURED IN PLENUM)	°C	59	58	57
TIMING	°BTDC	30	30	30
EXHAUST TEMPERATURE - ENGINE OUTLET	°C	543	507	485
EXHAUST GAS FLOW (0 °C, 101.3 kPa) (WET)	Nm ³ /bkW-hr	3.09	3.26	3.59
EMISSIONS DATA - CATALYST OUT				
NOx (as NO2) (corr. to 5% O2)	mg/Nm ³ DRY	204	193	175
CO (corr. to 5% O2)	mg/Nm ³ DRY	816	772	701
THC (mol. wt. of 15.84) (corr. to 5% O2)	mg/Nm ³ DRY	938	1046	1167
NMHC (mol. wt. of 15.84) (corr. to 5% O2)	mg/Nm ³ DRY	141	157	175
NMNEHC (VOCs) (mol. wt. of 15.84)	mg/Nm ³ DRY	94	105	117
HCHO (Formaldehyde) (corr. to 5% O2)	mg/Nm ³ DRY	31	36	41
CO2 (corr. to 5% O2)	g/Nm ³ DRY	188	188	187
EXHAUST OXYGEN	% DRY	0	0	0
ENERGY BALANCE DATA				
LHV INPUT	kW	1302	1024	751
HEAT REJECTION TO JACKET WATER (JW)	kW	407	347	284
HEAT REJECTION TO ATMOSPHERE	kW	52	41	30
HEAT REJECTION TO LUBE OIL (OC)	kW	61	52	43
HEAT REJECTION TO EXHAUST (LHV TO 25°C)	kW	301	223	157

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HEAT REJECTION TO EXHAUST (LHV TO 177°C)	kW	205	146	100
HEAT REJECTION TO AFTERCOOLER (AC)	kW	33	26	13

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

CAT METHANE NUMBER	30	35	40	45	50	55	60	65	70	75	80	85
SET POINT TIMING	16	15.5	15.5	15	17	19	20.5	22.5	24.5	26.5	28	30
DERATION FACTOR	0.9	0.93	0.96	1	1	1	1	1	1	1	1	1

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

Inlet air Temp. °C	ALTITUDE DERATION FACTORS AT RATED SPEED													
	50	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	45	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	40	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	35	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	30	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	25	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	20	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	15	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
	10	1	1	1	1	1	1	1	0.83	No rating	No rating	No rating	No rating	No rating
ALTITUDE (METERS ABOVE SEA LEVEL)														
	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	

ACTUAL ENGINE RATING:

To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).

- 1) Fuel Usage Guide Deration
- 2) $1 - ((1 - \text{Altitude/Temperature Deration}) + (1 - \text{RPC}))$

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF):

Aftercooler heat rejection is given for standard conditions of 25°C and 152 m altitude. To maintain a constant air inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor (ACHRF) to adjust for inlet air temp and altitude conditions. See Notes 22 and 23 below for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

Inlet air Temp. °C	AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)													
	50	1.47	1.54	1.61	1.69	1.76	1.84	1.91	1.92	No rating	No rating	No rating	No rating	No rating
	45	1.37	1.44	1.51	1.58	1.65	1.73	1.81	1.81	No rating	No rating	No rating	No rating	No rating
	40	1.26	1.33	1.40	1.48	1.55	1.62	1.70	1.71	No rating	No rating	No rating	No rating	No rating
	35	1.16	1.23	1.30	1.37	1.44	1.52	1.59	1.60	No rating	No rating	No rating	No rating	No rating
	30	1.06	1.13	1.20	1.27	1.34	1.41	1.48	1.49	No rating	No rating	No rating	No rating	No rating
	25	1	1.03	1.09	1.16	1.23	1.30	1.37	1.38	No rating	No rating	No rating	No rating	No rating
	20	1	1	1	1.06	1.13	1.19	1.27	1.27	No rating	No rating	No rating	No rating	No rating
	15	1	1	1	1	1.02	1.09	1.16	1.16	No rating	No rating	No rating	No rating	No rating
	10	1	1	1	1	1	1	1.05	1.06	No rating	No rating	No rating	No rating	No rating

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	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
ALTITUDE (METERS ABOVE SEA LEVEL)													

MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM):

This table shows the minimum allowable engine turndown speed where the engine will maintain the Rated Speed's Torque for the given ambient conditions.

Inlet air Temp. °C	MINIMUM SPEED CAPABILITY AT THE RATED SPEED'S SITE TORQUE (RPM)													
	50	1350	1350	1350	1350	1420	1490	1590	1600	No rating	No rating	No rating	No rating	No rating
	45	1350	1350	1350	1350	1350	1420	1500	1500	No rating	No rating	No rating	No rating	No rating
	40	1350	1350	1350	1350	1350	1350	1480	1500	No rating	No rating	No rating	No rating	No rating
	35	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	30	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	25	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	20	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	15	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	10	1350	1350	1350	1350	1350	1350	1350	1350	No rating	No rating	No rating	No rating	No rating
	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	
ALTITUDE (METERS ABOVE SEA LEVEL)														

EMCP 4.3 FEATURES

140 mm (5.5 in) Graphical Display

- Generator AC voltage
 - 3-phase (L-L & L-N)
 - $\pm 0.25\%$ accuracy
- rpm and battery voltage
- Generator AC current (per phase and average)
- Generator frequency
- Power metering (kW, kVA, kVAR, pf)
- Hour meters (kW-hour, kVAR-hour)
- Engine oil pressure (psi, kPa, or bar)
- Engine oil temperature (°C or °F)
- Engine coolant temperature (°C or °F)
- Coolant level
- Multiple language support
- Engine start and crank attempt counter
- Real-time clock

Communication

- Accessory CAN data link
- RS-485 annunciator data link
- RS-485 SCADA (Modbus RTU)
- Ethernet SCADA (Modbus TCP)

Controls

- Auto/start/stop
- Engine cooldown timer
- Emergency stop
- Engine cycle crank
- Programmable cycle timer

Generator Set Protection

- Over/under voltage
- Over/under frequency
- Generator phase sequence
- Over current (timed and inverse)
- Reverse kW, kVA
- Current balance

- Low oil pressure
- High coolant temp
- Low coolant level
- Fail to start
- Overspeed

Outputs

- 16 programmable digital outputs
- 3 programmable (4-20 mA or $\pm 10V$)
- 2 programmable (PWM)

Inputs

- Emergency stop
- Remote start
- 12 programmable digital inputs
- Oil pressure and water temperature
- 3 programmable inputs ($\pm 10V$, PWM, current, or resistive)
- Oil temperature, fuel level

AGC-4

- Generator protective features: 25 sync-check; 32 rev. power; 40 loss of excitation (AGC-4 impedance based); 50/51 Inst. and time overcurrent (GCB trip unit and AGC-4); 47 negative voltage sequence; 46 negative sequence current; 27/59 phase under/over voltage; 81O/I under/over frequency
- Package mounted AG-4 controls provides auto paralleling. CAN-bus, Ethernet communications, PWN and analog outputs, and legacy analog load sharing (real and reactive)
- AGC-4 main display

Other Features

- 16 languages supported:
 - Arabic - Greek
 - Chinese - Italian
 - Danish - Japanese
 - Dutch - Portuguese
 - English - Russian

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- Finnish - Spanish
- French - Swedish
- German - Turkish
- Programmable security levels
- Reduced power mode
- Programmable kW relay
- Cat switchgear integration and Status event log

MODES OF OPERATION

Provides for single unit stand-alone operation, island mode paralleling and load sharing with other power modules, and single unit-to-utility mode paralleling for base load control (with open transition between paralleling modes) (Exclusive Caterpillar Intellectual Property)

- Island mode paralleling features:
 - AGC-4 control allows single unit to connect to a dead bus
 - Auto synchronization (voltage & phase matching)
 - Load sharing (kW) analog signal (like units & legacy compatible)
 - Load sharing (kVAR) analog signal (like units only)
- Utility mode paralleling features:
 - Auto synchronization (voltage & phase matching)
 - Base-load control (selectable: programmable set-point or potentiometer adjust)
 - Soft load/unload (programmable, shared set-point)
 - Power Factor control (programmable set-point)

RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/ generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

Conditions: Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in Hg) and 15°C (59°F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in Hg) and 15.6°C (60.1°F). Air flow is based on a cubic foot at 100 kPa (29.61 in Hg) and 25°C (77°F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in Hg) and stack temperature.

WEIGHTS AND DIMENSIONS

Length	11,887 mm
Width	3058 mm
Height	3365 mm
Weight- dry	19,960 kg

CPR001-XGF400 GAS RENTAL

FREE FIELD MECHANICAL & EXHAUST NOISE

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Percent load	Engine power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	448	111.0	73.9	81.8	81.9	87.6	93.0	93.6	96.8	97.3	98.1	98.4
75	336	110.4	74.0	81.2	81.3	86.8	90.7	92.0	96.0	95.5	97.2	97.1
50	224	110.0	74.8	75.9	80.2	84.7	88.3	88.0	94.0	94.0	96.5	96.0

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Percent load	Engine power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	448	101.3	103.5	102.0	101.4	99.5	100.9	95.7	92.3	95.6	89.2	87.1
75	336	100.2	103.1	101.1	100.8	99	101.8	95.5	92.1	94.2	87.2	88.0
50	224	98.5	103.2	101.3	100.5	98.9	102.1	95.3	92.8	89.5	86.4	84.8

EXHAUST: Sound Power (1/3 Octave Frequencies)

Percent load	Engine power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	448	111.6	89.7	96.9	96.2	102.7	102.5	100.0	101.3	102.0	102.7	103.6
75	336	110.7	86.1	92.4	94.1	101.2	99.9	97.5	101.0	103.0	104.0	101.4
50	224	108.7	81.2	86.4	93.0	98.8	97.6	97.1	99.5	101.3	101.9	98.5

EXHAUST: Sound Power (1/3 Octave Frequencies)

Percent load	Engine power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
%	bkW	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
100	448	98.8	96.8	93.0	90.0	88.8	83.9	79.7	71.9	63.7	54.2	47.4
75	336	97.9	95.3	91.0	88.1	85.3	79.5	76.5	67.2	58.6	49.2	48.6
50	224	95.3	94.1	89.3	85.1	82.9	77.0	73.9	63.6	53.3	47.6	44.2

SOUND PARAMETER DEFINITION:

Sound Power Level Data - DM8702-01

FINNING GENERATOR RENTALS 24/7 LINE: 1-855-999-6751

<http://www.finningrentalpower.ca>

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Sound power is defined as the total sound energy emanating from a source irrespective of direction or distance. Sound power level data is presented under two index headings:

Sound power level -- Mechanical

Sound power level -- Exhaust

Mechanical: Sound power level data is calculated in accordance with ISO 6798. The data is recorded with the exhaust sound source isolated.

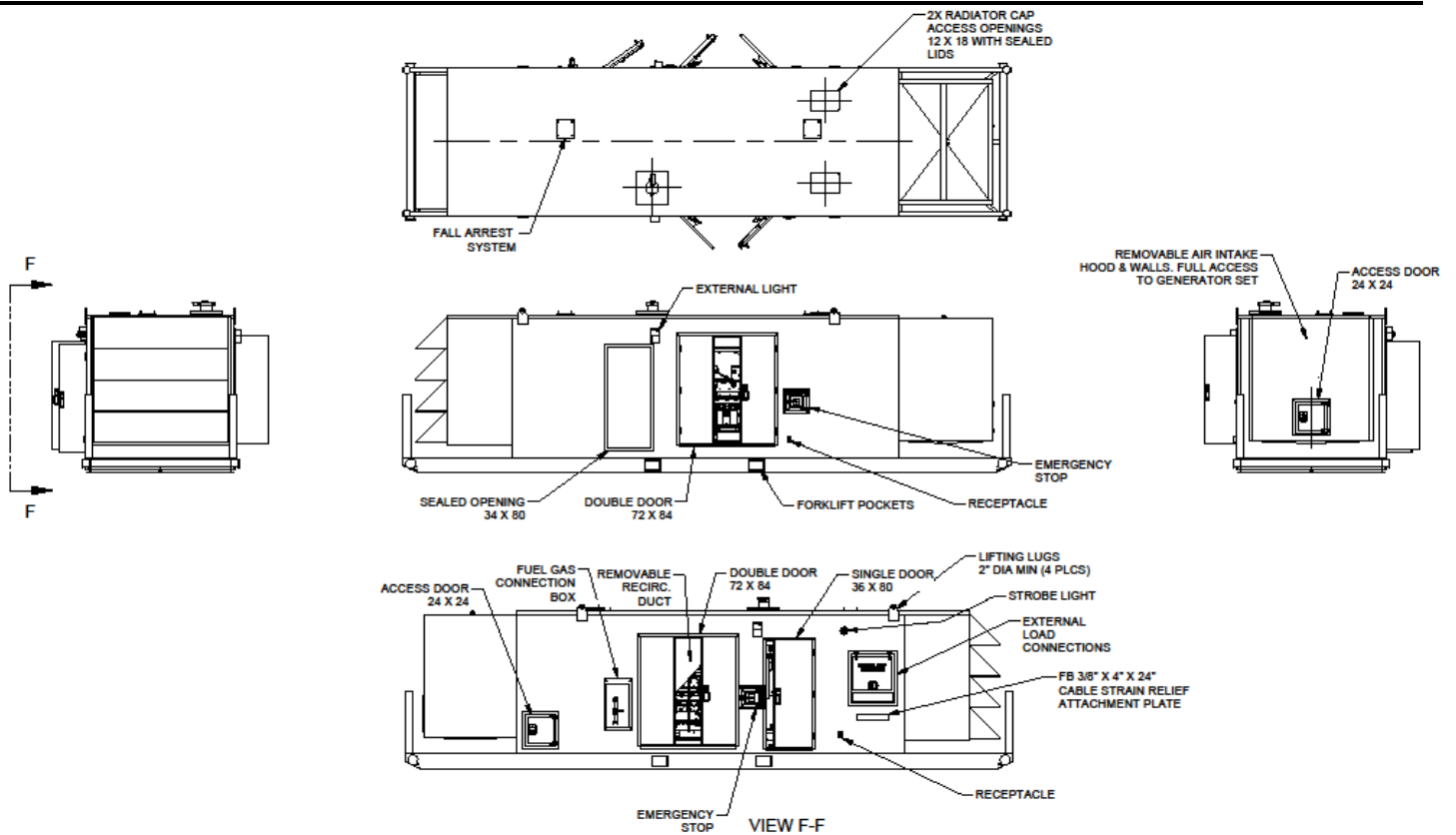
Exhaust: Sound power level data is calculated in accordance with ISO 6798 Annex A.

Measurements made in accordance with ISO 6798 for engine and exhaust sound level only. No cooling system noise is included unless specifically indicated. Sound level data is indicative of noise levels recorded on one engine sample in a survey grade 3 environment.

How an engine is packaged, installed and the site acoustical environment will affect the site specific sound levels. For site specific sound level guarantees, sound data collection needs to be done on-site or under similar conditions.

EQUIPMENT LAYOUT

CPR001-XGF400 GAS RENTAL



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