



# C280-8 Offshore Generator Set

2600 kW  
2710 kW (3634 bhp)  
50 Hz @ 1000 rpm

## CAT® ENGINE SPECIFICATIONS

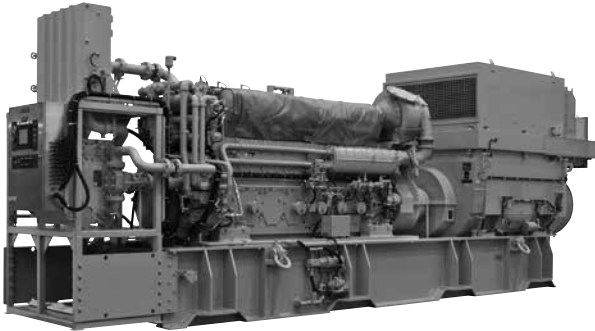


Image shown with optional attachments

### I-8, 4-Stroke-Cycle-Diesel

Emissions .....	IMO Tier II/EPA Marine Tier 2
Bore .....	280 mm (11.0 in)
Stroke .....	300 mm (11.8 in)
Displacement .....	148 L (9031 in <sup>3</sup> )
Aspiration .....	Turbocharged-Aftercooled
Governor and Protection .....	Electronic ADEM™ A3
Refill Capacity	
Cooling System .....	530 L (140 U.S. gal)
Lube Oil System (refill) .....	1094 L (289 U.S. gal)
Oil Change Interval .....	1325 hours

## FEATURES

### Engine Design

- Incorporates 20 years of proven component reliability and durability from 3600 engines

### Improved Fuel Efficiency

- Electronic Unit Injection (EUI) fuel system provides optimized combustion at any load
- Lower specific fuel consumption at part load
- Reduced transient smoke and emissions

### Caterpillar Packaging Concept

- Offshore drilling package provides single lift handling
- Caterpillar warranty for all packaged components
- Includes most ancillaries, ready-to-run package
- Easy to handle and install, few shipped-loose parts

### Custom Packaging

For any petroleum application, trust Caterpillar to meet your exact needs with a factory custom package. Cat® engines, generators, enclosures, controls, radiators, transmissions — anything your project requires — can be custom designed and matched to create a one-of-a-kind solution. Custom packages are globally supported and are covered by a one-year warranty after startup.

### Full Range of Attachments

Large variety of factory-installed engine attachments reduces installation time

### Testing

Every engine is full-load tested to ensure proper engine performance.

### Product Support Offered Through Global Cat Dealer Network

- More than 2,200 dealer outlets
- Caterpillar 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<sup>SM</sup> 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

### Over 80 Years of Engine Manufacturing Experience

- Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products.
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

### Web Site

For all your petroleum power requirements, visit [www.catoilandgasinfo.com](http://www.catoilandgasinfo.com).

## STANDARD EQUIPMENT

### Product Consist

The engine is a turbocharged, water aftercooled, four stroke cycle, electronic unit injection engine with a 280 mm (11 in) bore by 300 mm (11.8 in) stroke. SAE standard rotation. Counterclockwise viewed from the rear of engine flywheel.

### Air Inlet System

Aftercooler, fresh water, corrosion resistant coated (air side); air inlet shutoff; breather, crankcase, top-mounted; turbocharger, rear-mounted, engine oil lubricated

### Control System

Single Cat ADEM A3 electronic engine control module with electronic unit injector fuel system, rigid wiring harness (10 amp 24V power required to drive electronic engine control modules)

### Cooling System

Engine coolant water drains

### Exhaust System

Dry, gas tight, exhaust manifold

### Fuel System

Distillate fuel (requires viscosity ranging from 1.4 cSt to 20 cSt at 38°C), fuel transfer pump (mounted on left-hand side), duplex fuel filters, electronically controlled unit injectors

### Lube System

Centrifugal oil filters with single shutoff, service-side engine mounted on cylinder block inspection covers (includes installed oil lines and single shutoff valve), filters centrifuge bypass oil from the main lubricating oil pump (can be serviced with the engine running), oil filler and dipstick, oil pressure regulating valve, crankcase explosion relief valves

### Protection System

PLC-based system provides protection, monitoring, and control housed in a NEMA 4 (IP66) enclosure. All critical shutdowns have both relay-based and PLC-based protection. Sensors are factory wired.

#### Features:

- 254 mm (10.0 in) color monitor to display all engine parameters and alarm annunciation
- Annunciation of all engine shutdowns, alarms and status points
- Start/prelube control switch, fuel control switch and emergency stop button
- Selection of local/remote control of engine
- Selection of idle/rated control of engine
- Equipped for remote communication
- Four 4-20 mA outputs (programmable)
- Relay contact signals to the remote monitoring system (summary shutdown, summary alarm, local operation/remote, engine running, PLC failure, fuel control and idle/rated)

**Contactors:** lube oil pressure (high/low speed), jacket water pressure, AC/OC pressure, start air pressure, crankcase pressure

**4-20 mA Transducers:** lube oil pressure (to filter/to engine), fuel pressure (to filter/to engine), inlet air manifold pressure RTD (PT 100): lubricating oil to engine temperature, inlet air manifold temperature, fuel to engine temperature, AC/OC inlet temperature, jacket water outlet temperature (alarm), jacket water outlet temperature (shutdown), generator rear bearing temperatures (front and rear), generator stator A temperatures (A, B, and C)

**Switches:** jacket water detector, metal particle detector, starting oil pressure or detector

**Thermocouples:** exhaust thermocouples (one per cylinder plus inlet to turbine and stack)

**Alarm Pressures:** low oil pressure, high oil filter differential, low fuel pressure, high fuel filter differential, high inlet air manifold pressure, low starting air pressure, low jacket water pressure, low AC/OC water pressure, low raw/sea water pressure (customer supplied contact)

**Alarm Temperatures:** high lube oil temperature, high inlet air manifold temperature, high fuel temperature, high AC/OC inlet temperature, high jacket water outlet temperature, high generator bearing temperatures (front and rear), high generator front bearing temperature (genset only), high generator stator temperatures (A, B, and C), high individual exhaust port temperature, high turbine inlet temperature, high exhaust stack temperature, high exhaust port deviation temperature

**Other Alarms:** low battery voltage, low oil level, jacket water detection, low coolant level (switch supplied with an expansion tank or customer supplied if an expansion tank is not selected), metal particle detection

**Shutdown Pressures:** low oil pressure, high crankcase pressure

**Shutdown Temperatures:** high jacket water temperature, high lube oil temperature, high generator bearing temperature

**Other Shutdowns:** metal particle detector, engine overspeed, customer shutdown (normally open contact customer supplied)

**Programmable Inputs:** The customer can wire display and alarm on two customer supplied RTDs, and two customer supplied 4-20mA (0-10 VDC) sensors, three discrete alarms, and three discrete shutdowns.

**Gauges:** In addition to the 10-inch color monitor that displays all engine parameters, there are also three engine-mounted gauges and three control panel gauges. The three engine-mounted gauges are fuel pressure, lube oil pressure, and inlet air restriction. The three control panel gauges are an engine hour meter, digital tachometer, and a starting air pressure gauge.

**Lights:** Four lights are included on the control panel for displaying prelube status, summary alarm, summary shutdown, and PLC failure.

### General

Paint, Cat yellow

Pumps, gear-driven: fuel, oil, jacket water, aftercooler/oil cooler water, SAE standard rotation — CCW

### Literature

Two complete sets of service literature listed below: serial number-specific custom parts book CD, service manual (Operation & Maintenance, Specifications, Systems Operation, Testing and Adjusting, Disassembly and Assembly manual), and technical manual (parts/service information for special equipment)

## OPTIONAL ATTACHMENTS

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### Emission Certification

GL and CCS approved IMO certificate — includes statement of compliance or Engine International Air Pollution Prevention (EIAPP) certificate, supplied by the Recognized Organization (RO) where available and technical file to be kept on board per IMO regulations.

### Marine Society Requirements

Spray shielding to meet SOLAS regulations for flammable fluids

### European Certifications

Declaration of Incorporation for EU Machinery Safety Directive and EU Low Voltage Safety Directive

### General

Base assembly  
 Vertically-restrained vibration isolators and weld plates  
 Torsional couplings  
 Mounting groups for engine, generator, and base  
 Accessory module to mount attachments such as the expansion tank, heat exchanger, instrument panel and engine controls, annunciator panel, alarm and shutdown contactors, fuel strainer  
 Flywheel  
 Flywheel and damper guards  
 Engine barring device  
 1:1 manual barring device  
 50:1 manual barring device  
 Electric barring device  
 One-year storage preservation  
 Oceanic transportation shipping protection (shrink wrap and tarp)  
 Engine testing — certified dynamometer test, fuel consumption test, rated speed performance test, overload test, minimum power setting, peak firing pressure test, turbo work cert and crankshaft work cert  
 Standard and project-specific witness testing

### Air Inlet System

90° adapter and straight adapters for air inlet to turbocharger  
 Air cleaners  
 Air cleaners with Cat dry paper filter elements (approximately 99.9% efficient at filtering SAE fine dust)  
 Soot filter

### Control System

4-20 mA load feedback signal  
 Load sharing module  
 Direct rack module

### Cooling System

Separate Circuit Aftercooler (SCAC)  
 Customer water connections  
 Jacket water thermostats  
 AC/OC thermostats  
 Accessory module-mounted high volume expansion tank  
 Jacket water heaters  
 Heat recovery connections and thermostats for use with water maker system  
 ANSI cooling system flanged connections

### Exhaust System

Exhaust manifold shields  
 Vertical or 30° outboard exhaust orientation options  
 Exhaust outlet expanders and weld flanges

### Fuel System

Manual fuel priming pump  
 Duplex primary fuel strainer  
 Flexible fuel hose connections

### Lube System

Dry engine-mounted sump system that gravity feeds into base assembly integral sump  
 Engine-mounted duplex oil filter  
 Intermittent air prelube  
 Continuous electric prelube  
 Redundant prelube with continuous electric prelube and intermittent air prelube backup  
 Oil pan drain valves  
 Electric continuous prelube pump  
 Lube oil heater

### Protection System

Wiring meets MCS requirements  
 Upgrade PLC monitor to industrial PC  
 Upgrades AC/OC, JW and start air pressure from contactors to transducers  
 Raw water/sea water pressure transducer  
 Modbus communication  
 Beacon and horn  
 Single engine remote display monitor  
 Emergency pump start signal  
 Cabinet cooler  
 Generator power monitoring  
 Remote relay panel  
 Turbocharger speed sensors  
 Cylinder pressure relief valve  
 Oil mist detector

### Starting System

Single turbine air starters  
 Boost control valve for extremely cold ambient conditions  
 Air start pressure reducing valves

### Optional Literature

Project-specific installation drawings  
 Electrical schematics and P&IDs

### Spare Parts Kits



DIESEL ENGINE TECHNICAL DATA

C280-8 Engine — 2710 bkW (1000 rpm)

<b>Genset</b>	<b>50 Hz</b>
ENGINE SPEED (rpm):	1000
COMPRESSION RATIO:	13:1
AFTERCOOLER WATER (°C):	32
JACKET WATER INLET (°C):	90
IGNITION SYSTEM:	EUI
EXHAUST MANIFOLD:	DRY
FIRING PRESSURE, MAXIMUM (kPa)	17300

CERTIFICATION:	IMO II/EPA MARINE TIER II
TURBOCHARGER PART #:	284-8277
FUEL TYPE:	Distillate
RATED ALTITUDE @ 25°C (m):	150
ASSUMED GENERATOR EFFICIENCY (%):	96
ASSUMED GENERATOR POWER FACTOR:	0.8
MEAN PISTON SPEED (m/s):	10

RATING	NOTES	LOAD	110%	100%	75%	50%
ENGINE POWER	(2)	bkW	2981	2710	2033	1355
GENERATOR POWER	(2)	ekW	2860	2600	1950	1300
BMEP		kPa	2421	2201	1651	1101
ENGINE EFFICIENCY	(ISO 3046/1) (1)	%	42.7%	42.4%	39.5%	39.3%
ENGINE EFFICIENCY	(NOMINAL) (1)	%	41.5%	41.1%	38.3%	38.1%

ENGINE DATA				110%	100%	75%	50%
FUEL CONSUMPTION	(ISO 3046/1) (1)	g/bkW-hr	197.9	199.5	214.4	215.3	
FUEL CONSUMPTION	(NOMINAL) (1)	g/bkW-hr	201.7	203.4	218.5	219.5	
FUEL CONSUMPTION	(90% CONFIDENCE) (1)	g/bkW-hr	203.8	205.6	221.0	222.3	
AIR FLOW (@ 25°C, 101.3 kPaa)		Nm3/min	332.3	306.4	260.5	154.1	
AIR MASS FLOW		kg/hr	22241	20505	17432	10311	
INLET MANIFOLD PRESSURE		kPa (abs)	434.7	398.1	336.0	199.3	
INLET MANIFOLD TEMPERATURE		°C	46.3	45.5	43.7	42.2	
EXHAUST STACK TEMPERATURE		°C	360.3	357.2	369.9	443.9	
EXHAUST GAS FLOW (@ stack temp, 101.3 kPa)		m3/min	713.0	653.5	544.7	322.6	
EXHAUST GAS MASS FLOW		kg/hr	22843	21057	17877	10608	

EMISSIONS "NOT TO EXCEED DATA"			110%	100%	75%	50%
Nox as NO2 + THC (molecular weight of 13.018)		g/bkW-hr	10.72	9.06	8.20	7.90
Nox as NO2		g/bkW-hr	9.19	7.98	7.19	6.53
CO		g/bkW-hr	0.85	0.79	0.68	1.26
THC (molecular weight of 13.018)		g/bkW-hr	1.53	1.08	1.01	1.37
Particulates		g/bkW-hr	0.31	0.28	0.24	0.44

EMISSIONS "NOMINAL DATA"			110%	100%	75%	50%
NOx (as NO) + THC (molecular weight of 13.018)		g/bkW-hr	9.17	7.77	7.03	6.73
NOx (as NO)		g/bkW-hr	7.99	6.94	6.25	5.68
CO		g/bkW-hr	0.65	0.61	0.52	0.97
THC (molecular weight of 13.018)		g/bkW-hr	1.17	0.83	0.78	1.05
Particulates		g/bkW-hr	0.22	0.20	0.17	0.31

ENERGY BALANCE DATA			110%	100%	75%	50%
FUEL INPUT ENERGY (LHV)	(NOMINAL) (1)	KW	7189	6591	5308	3556
HEAT REJ. TO JACKET WATER	(NOMINAL) (3)	KW	582	539	440	344
HEAT REJ. TO ATMOSPHERE	(NOMINAL) (4)	KW	144	132	106	71
HEAT REJ. TO OIL COOLER	(NOMINAL) (5)	KW	299	285	252	219
HEAT REJ. TO EXH. (LHV to 25°C)	(NOMINAL) (3)	KW	2181	2043	1825	1347
HEAT REJ. TO EXH. (LHV to 177°C)	(NOMINAL) (3)	KW	1809	1723	1438	767
HEAT REJ. TO AFTERCOOLER	(NOMINAL) (6) (7)	KW	984	866	641	212

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 AND SAE J1995 JAN90 STANDARD REFERENCE CONDITIONS OF 25°C, 100 KPA, 30% RELATIVE HUMIDITY AND 150M ALTITUDE AT THE STATED AFTERCOOLER WATER TEMPERATURE. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE. PERFORMANCE AND FUEL CONSUMPTION ARE BASED ON 35 API, 16°C FUEL HAVING A LOWER HEATING VALUE OF 42.780 KJ/KG USED AT 29°C WITH A DENSITY OF 838.9 G/LITER.

NOTES

- 1) FUEL CONSUMPTION TOLERANCE. ISO 3046/1 IS 0, + 5% OF FULL LOAD DATA. NOMINAL IS ± 3 % OF FULL LOAD DATA.
- 2) ENGINE POWER TOLERANCE IS ± 3 % OF FULL LOAD DATA.
- 3) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ± 10% OF FULL LOAD DATA. (heat rate based on treated water)
- 4) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ±50% OF FULL LOAD DATA. (heat rate based on treated water)
- 5) HEAT REJECTION TO LUBE OIL TOLERANCE IS ± 20% OF FULL LOAD DATA. (heat rate based on treated water)
- 6) HEAT REJECTION TO AFTERCOOLER TOLERANCE IS ± 5% OF FULL LOAD DATA. (heat rate based on treated water)
- 7) TOTAL AFTERCOOLER HEAT = AFTERCOOLER HEAT x ACHRF (heat rate based on treated water)
- 8) FUEL CONSUMPTION DATA IS WITHOUT SEA WATER PUMP.



**DIESEL ENGINE TECHNICAL DATA**

**C280-8 Engine — 2710 kW (1000 rpm)**

ALTITUDE DERATION FACTORS														
AIR TO TURBO (°C)	50	0.94	0.91	0.88	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69	0.67	0.65
	45	0.95	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70	0.68	0.66
	40	0.97	0.94	0.91	0.89	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69	0.67
	35	0.98	0.96	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70	0.68
	30	1.00	0.97	0.94	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.71	0.69
	25	1.00	0.99	0.96	0.93	0.90	0.88	0.85	0.82	0.80	0.77	0.75	0.73	0.70
	20	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.72
	15	1.00	1.00	0.99	0.96	0.93	0.91	0.88	0.85	0.83	0.80	0.78	0.75	0.73
	10	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.87	0.84	0.82	0.79	0.77	0.74
			0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750

ALTITUDE (METERS ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS														
AIR TO TURBO (°C)	50	1.23	1.27	1.30	1.34	1.38	1.42	1.45	1.49	1.53	1.56	1.60	1.64	1.67
	45	1.18	1.22	1.25	1.29	1.32	1.36	1.39	1.43	1.46	1.50	1.53	1.57	1.61
	40	1.13	1.17	1.20	1.23	1.27	1.30	1.34	1.37	1.40	1.44	1.47	1.50	1.54
	35	1.08	1.12	1.15	1.18	1.21	1.24	1.28	1.31	1.34	1.37	1.41	1.44	1.47
	30	1.03	1.06	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.34	1.37	1.40
	25	1.00	1.01	1.04	1.07	1.10	1.13	1.16	1.19	1.22	1.25	1.28	1.31	1.34
	20	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.13	1.16	1.19	1.21	1.24	1.27
	15	1.00	1.00	1.00	1.00	1.00	1.02	1.04	1.07	1.10	1.12	1.15	1.18	1.20
	10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.04	1.06	1.09	1.11	1.14
			0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750

ALTITUDE (METERS ABOVE SEA LEVEL)

FREE FIELD MECHANICAL NOISE										
SOUND PRESSURE LEVEL dB(A)										
DISTANCE FROM THE ENGINE (M)	15M	94	93.2	90.1	89.3	89.6	90.8	86.5	82.5	74.5
	7M	100	98.7	95.6	94.8	95.1	96.3	92	88	80
	1M	111	109.7	106.6	105.8	106.1	107.3	103	99	91
	Overall	63	125	250	500	1000	2000	4000	8000	
		Octave Band (Hz)								

FREE FIELD EXHAUST NOISE										
SOUND PRESSURE dB(A)										
DISTANCE FROM THE ENGINE (M)	15M	97	108.6	105.6	96.0	92.1	87.2	88.2	86.2	80.4
	7M	104	115.4	112.9	104.2	98.9	94.9	94.9	93.0	88.2
	1.5M	117	128.9	126.0	116.3	112.4	107.6	108.5	106.6	100.8
	Overall	63	125	250	500	1000	2000	4000	8000	
		Octave Band (Hz)								

**TOTAL DERATION FACTORS:**

This table shows the deration required for various air inlet temperatures and altitudes. Use this information to help determine actual engine power for your site. The total deration factor includes deration due to altitude and ambient temperature, and air inlet manifold temperature deration.

**AFTERCOOLER HEAT REJECTION FACTORS:**

Aftercooler heat rejection is given for standard conditions of 25°C and 150 m altitude. To maintain a constant air inlet manifold temperature, as the air to turbo 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 to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection.

**GENERATOR EFFICIENCY:**

Generator power determined with an assumed generator efficiency of 96% [generator power = engine power x 0.96]. If the actual generator efficiency is less than 96% [and greater than 94.5%], the generator power [kW] listed in the technical data can still be achieved. The BSFC values must be increased by a factor. The factor is a percentage = 96% - actual generator efficiency

**SOUND DATA:**

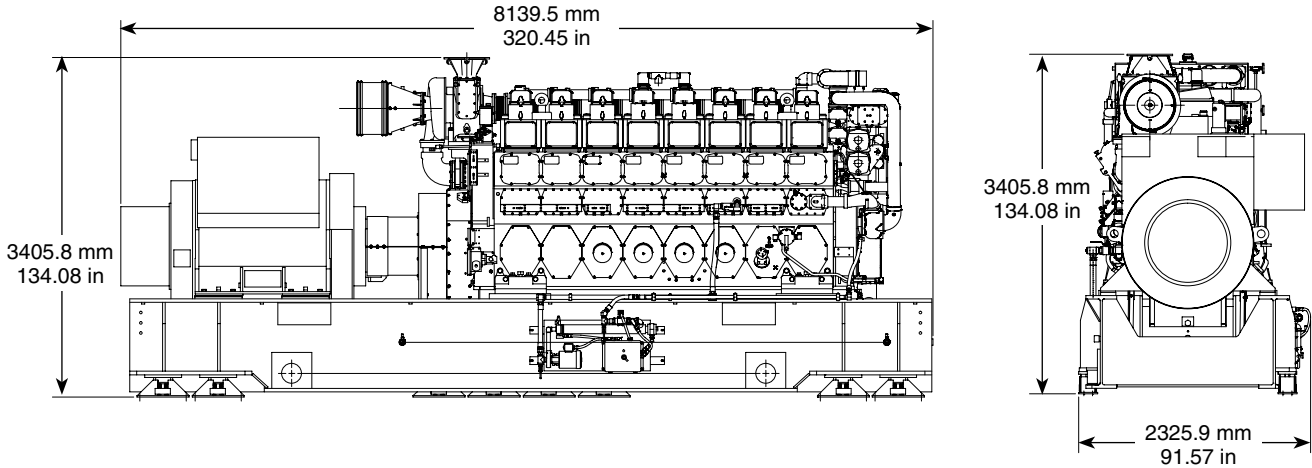
Data determined by methods similar to ISO Standard DIS-8528-10. Accuracy Grade 3.



# C280-8 OFFSHORE GENERATOR SET

2600 kW  
2710 bkW (3634 bhp)

## DIMENSIONS



Dimensions and Weight		
<b>Length</b>	8139.5 mm	320.45 in
<b>Width</b>	2325.9 mm	91.57 in
<b>Height</b>	3405.8 mm	134.08 in
<b>Weight – dry</b>	49 000 kg	108,027 lb

**Note:** Dimensions are dependent on generator and options selected. See general installation drawings for detail.

**Note:** Weight includes engine, generator, base, coupling, water/lube oil heater, generator lubrication module, and piping. Weight may vary depending upon individual configuration.

## RATING DEFINITIONS AND CONDITIONS

**Rating Definition** — Maximum Continuous Rating (MCR) following reference conditions according to the International Association of Classification Societies (IACS) for main and auxiliary engines. An overload of 10% is permitted for one hour within 12 hours of operation.

**Conditions** are based on SAE J1995 standard conditions of 100 kPa (29.61 in Hg) and 25°C (77°F). These ratings also apply at ISO3046/1, DIN6271, and BS5514 standard conditions of 100 kPa (29.61 in Hg),

27°C (81°F), and 60% relative humidity. Ratings are valid for air cleaner inlet temperatures up to and including 60°C (140°F).

**Fuel Consumption** — 5% tolerance and based on fuel oil of 35° API [16°C (60°F)] gravity having an LHV of 62 780 kJ/kg (18,390 Btu/lb) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal). Fuel consumption is shown with all engine-driven oil, fuel, and water pumps.

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