



## C280-16 Offshore Generator Set

5200 ekW (6500 kVA) 0.8 pf  
5420 bkW (7268 bhp)  
50 Hz @ 1000 rpm

### CAT® ENGINE SPECIFICATIONS

#### V-16, 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	296 L (18,062 in <sup>3</sup> )
Aspiration	Turbocharged-Aftercooled
Governor and Protection	Electronic ADEM™ A4
Rated Speed	1000 rpm
Weight, net dry	
Engine	32 700 kg (72,100 lb)
Generator Set <sup>1</sup>	78 000 kg (172,000 lb)
Rotation (from flywheel end)	Counterclockwise
Refill Capacity	
Cooling System	1003 L (265 U.S. gal)
Lube Oil System (refill)	1677 L (443 U.S. gal)
Oil Change Interval	1000 hours

<sup>1</sup> ± 20% dependent upon individual configuration

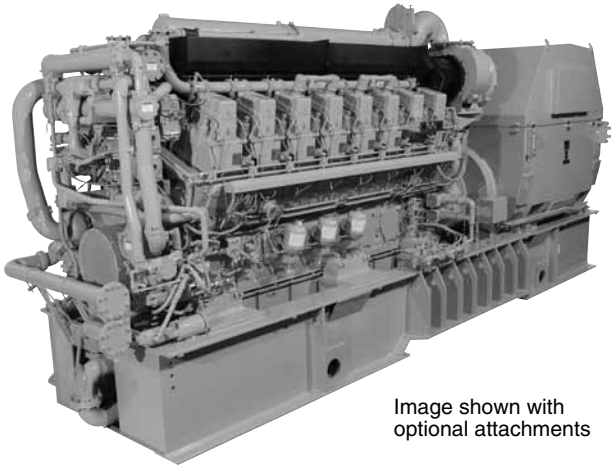


Image shown with optional attachments

### FEATURES

#### Engine Design

- Result of more than 20 years of proven 3600 engine family experience

#### Improved Fuel Efficiency

- Electronic Unit Injection (EUI) fuel system provides optimized combustion at any load
- BFSC optimized for drilling/production applications

#### Caterpillar Packaging Concept

- Offshore package provides single lift handling
- Includes most ancillaries, ready-to-run package
- Caterpillar warranty for all packaged components

#### 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  
Cat factory-trained dealer technicians service every aspect of your petroleum engine  
Cat 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 critical manufacturing and assembly processes enables Caterpillar to produce high quality, dependable products.

#### 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

Dual Cat ADEM A4 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; front-mounted water connections: JW outlet, AC/OC — JW Water pumps; AC/OC — JW Water pumps (gear-driven); separate circuit; 6" ANSI inlet jacket water/aftercooler pumps; 6" ANSI outlet jacket water

### 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

### Cat Alarm and Protection System

#### Features:

- 145 mm (5.7") color monitor to display all engine parameters and alarm annunciation, alarms annunciated with a time and date stamp
  - Annunciation of all engine shutdowns, alarms, and status points
  - Start/prelube control switch and emergency stop button
  - Selection of local/remote control of engine
  - Customer connections at terminal blocks inside panel
  - Equipped for remote communication MODBUS RS485 and MODBUS TCP
- Two configurable relay outputs

#### Engine Sensors:

- All engine sensors are monitored by the ECU or the Cat alarm and protection system
- The panel can display all engine parameters

#### Switches (All switches are located in the panel):

- Local throttle
- Cranking motor select
- Manual crank override
- Low idle
- Engine protection override
- Rapid start/stop
- Manual prelube
- Oil mist detector override

#### Alarms:

- LUBRICATION**
- Low Engine Oil Pressure
  - High Engine Oil Temperature
  - High Engine Oil Filter Restriction Pressure (differential)
- COOLANT**
- High Engine Coolant Temperature
  - Low Engine Coolant Temperature
  - Low Coolant Level

- High Aftercooler Coolant Temperature
  - Low Engine Coolant Pressure
  - Low Aftercooler Coolant Pressure
- EXHAUST**
- High Exhaust Port Temperature
  - High Exhaust Temperature Differential (R to L)
  - Exhaust Port Temperature High Deviation
  - Exhaust Port Temperature Low Deviation
  - High Turbo Turbine Inlet Temperature
  - High Turbo Speed
  - High Turbo Speed Differential
- FUEL**
- High Fuel Filter Restriction Pressure Differential
  - Low Fuel Pressure
- AIR**
- High Intake Manifold Air Temperature
  - High Crankcase Pressure
- MISCELLANEOUS**
- Engine Overspeed

#### Shutdowns: (Default Setting)

- LUBRICATION**
- Low Engine Oil Pressure (ON)
  - High Engine Oil Temperature (ON)
  - High Engine Oil Filter Restriction Pressure (differential) (OFF)
- COOLANT**
- High Engine Coolant Temperature (ON)
  - High Aftercooler Coolant Temperature (OFF)
- EXHAUST**
- High Exhaust Port Temperature (OFF)
  - Exhaust Port Temperature High Deviation (OFF)
  - Exhaust Port Temperature Low Deviation (OFF)
  - High Turbo Turbine Inlet Temperature (ON)
  - High Turbo Speed (ON)
- FUEL**
- High Fuel Filter Restriction Pressure Differential (OFF)
- AIR**
- High Intake Manifold Air Temperature (OFF)
  - High Crankcase Pressure (ON)
- MISCELLANEOUS**
- Engine Overspeed (ON)

#### Derate:

- LUBRICATION**
- High Engine Oil Temperature
- COOLANT**
- High Engine Coolant Temperature
  - High Aftercooler Coolant Temperature
- EXHAUST**
- High Turbo Turbine Inlet Temperature
  - Turbo Speed
- AIR**
- High Intake Manifold Air Temperature

#### Monitor and Display:

- Starting Air Pressure (Customer Wiring Required)
- High Generator Rear Bearing Temperature
- High Generator Front Bearing Temperature
- High Generator Stator A Temperature
- High Generator Stator B Temperature
- High Generator Stator C Temperature

#### 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**

---

**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**

Upgrades AC/OC, JW and start air pressure from contactors to transducers  
Raw water/sea water pressure transducer  
Beacon and horn  
Remote display monitor  
Emergency pump start signal  
Cabinet cooler  
Generator power monitoring  
Turbocharger speed sensors  
Cylinder pressure relief valve  
Oil mist detector

**Starting System**

Dual 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

C280-16 Engine — 5420 bkW (1000 rpm)

<b>Genset</b>	<b>50 Hz</b>	RATING:	Marine Aux - Prime
ENGINE SPEED (rpm):	1000	CERTIFICATION:	IMO II/EPA MARINE TIER II
COMPRESSION RATIO:	13:1	TURBOCHARGER PART #:	284-8277
AFTERCOOLER WATER (°C):	32	FUEL TYPE:	Distillate
JACKET WATER INLET (°C):	90	RATED ALTITUDE @ 25°C (m):	150
IGNITION SYSTEM:	EUI	ASSUMED GENERATOR EFFICIENCY (%):	96
EXHAUST MANIFOLD:	DRY	ASSUMED GENERATOR POWER FACTOR:	0.8
FIRING PRESSURE, MAXIMUM (kPa)	17300	MEAN PISTON SPEED (m/s):	10

RATING		NOTES	LOAD	110%	100%	75%	50%
ENGINE POWER		(2)	bkW	5962	5420	4065	2710
GENERATOR POWER		(2)	ekW	5720	5200	3900	2600
BMEP			kPa	2421	2201	1651	1101
ENGINE EFFICIENCY	(ISO 3046/1)	(1)	%	44.3%	43.7%	41.6%	39.4%
ENGINE EFFICIENCY	(NOMINAL)	(1)	%	43.0%	42.4%	40.3%	38.2%

ENGINE DATA				110%	100%	75%	50%
FUEL CONSUMPTION	(ISO 3046/1)	(1)	g/bkW-hr	191.0	193.6	203.5	214.8
FUEL CONSUMPTION	(NOMINAL)	(1)	g/bkW-hr	194.7	197.3	207.5	219.0
FUEL CONSUMPTION	(90% CONFIDENCE)	(1)	g/bkW-hr	196.8	199.5	210.0	221.7
AIR FLOW (@ 25°C, 101.3 kPaa)			Nm3/min	620.5	566.2	470.2	306.3
AIR MASS FLOW			kg/hr	41530	37895	31472	20497
INLET MANIFOLD PRESSURE			kPa (abs)	405.0	365.3	303.3	198.2
INLET MANIFOLD TEMPERATURE			°C	44.6	44.2	43.3	42.2
EXHAUST STACK TEMPERATURE			°C	356.5	362.5	382.0	444.6
EXHAUST GAS FLOW (@ stack temp, 101.3 kPa)			m3/min	1332.1	1209.0	984.6	641.4
EXHAUST GAS MASS FLOW			kg/hr	42680	38954	32316	21091

EMISSIONS "NOT TO EXCEED DATA"				110%	100%	75%	50%
Nox as NO2 + THC (molecular weight of 13.018)			g/bkW-hr	11.03	11.66	10.47	9.57
Nox as NO2			g/bkW-hr	9.56	10.55	9.46	8.26
CO			g/bkW-hr	0.85	0.79	0.68	1.26
THC (molecular weight of 13.018)			g/bkW-hr	1.47	1.11	1.01	1.31
Particulates			g/bkW-hr	0.31	0.28	0.25	0.39

EMISSIONS "NOMINAL DATA"				110%	100%	75%	50%
NOx (as NO2) + THC (molecular weight of 13.018)			g/bkW-hr	9.44	10.03	9.00	8.19
NOx (as NO2)			g/bkW-hr	8.31	9.18	8.22	7.18
CO			g/bkW-hr	0.65	0.61	0.52	0.97
THC (molecular weight of 13.018)			g/bkW-hr	1.13	0.86	0.78	1.01
Particulates			g/bkW-hr	0.22	0.20	0.18	0.28

ENERGY BALANCE DATA				110%	100%	75%	50%
FUEL INPUT ENERGY (LHV)	(NOMINAL)	(1)	KW	13878	12788	10079	7096
HEAT REJ. TO JACKET WATER	(NOMINAL)	(3)	KW	1164	1079	881	687
HEAT REJ. TO ATMOSPHERE	(NOMINAL)	(4)	KW	278	256	202	142
HEAT REJ. TO OIL COOLER	(NOMINAL)	(5)	KW	598	569	503	437
HEAT REJ. TO EXH. (LHV to 25°C)	(NOMINAL)	(3)	KW	4091	3897	3394	2683
HEAT REJ. TO EXH. (LHV to 177°C)	(NOMINAL)	(3)	KW	3465	3192	2516	1524
HEAT REJ. TO AFTERCOOLER	(NOMINAL)	(6) (7)	KW	1750	1534	1011	419

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**

**C280-16 Engine — 5420 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	1.01	1.04	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														
Nox as NO2 DISTANCE FROM THE ENGINE (M)	15M 7M 1M	dB(A)	SOUND PRESSURE LEVEL											
			dB											
		95	84.7	90.7	90.2	90.8	89.8	87.8	86.5	84.1				
		101	90.2	96.2	95.7	96.3	95.3	93.3	92	89.6				
		112	101.2	107.2	106.7	107.3	106.3	104.3	103	100.6				
	Overall	63	125	250	500	1000	2000	4000	8000					

Octave Band (Hz)

FREE FIELD EXHAUST NOISE														
DISTANCE FROM THE ENGINE (M)	15M 7M 1.5M	dB(A)	SOUND PRESSURE LEVEL											
			dB											
		99	110.6	107.6	98.0	94.1	89.2	90.2	88.2	82.4				
		106	117.4	114.9	106.2	100.9	96.9	96.9	95.0	90.2				
		119	130.9	128.0	118.3	114.4	109.6	110.5	108.6	102.8				
	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%

8) FUEL CONSUMPTION DATA IS WITHOUT SEA WATER PUMP.

The factor is a percentage = 96% - actual generator efficiency

**SOUND DATA:**

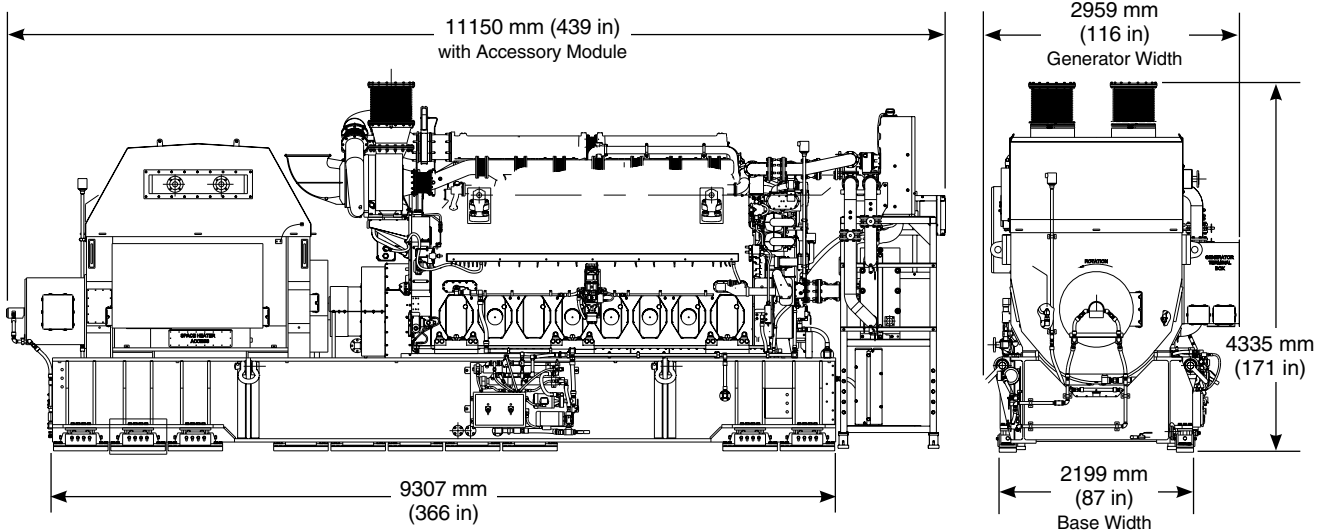
Data determined by methods according to TM7080.



# C280-16 OFFSHORE GENERATOR SET

5200 kW  
5420 kW (7268 bhp)

## DIMENSIONS



Dimensions		
Length with Accessory Module	11150 mm	439 in
Length of Base	9307 mm	366 in
Width of Generator Set	2959 mm	116 in
Width of Base	2199 mm	87 in
Height of Generator Set	4335 mm	171 in

**Note:** Do not use for installation design. Dimensions are dependent on generator and options selected. See general dimension drawings for detail.

## RATING DEFINITIONS AND CONDITIONS

**Prime Power** — This rating is designed for 60% load factor and 6,000 operating hours per year. This rating is capable of 110% overload for one hour of operation over a 12-hour period.

**Ratings** 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** has a tolerance of +5% and is based on fuel oil of 35° API [16° C (60°F)] gravity having an LHV of 42 780 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 shown with all oil, fuel, and water pumps, engine driven.

Information contained in this publication may be considered confidential. Discretion is recommended when distributing. Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication. CAT, CATERPILLAR, their respective logos, ADEM, S•O•S, "Caterpillar Yellow" and the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.