



## C280-16 Offshore Generator Set

5200 ekW  
5420 bkW (7268 bhp)  
50 Hz (1000 rpm)

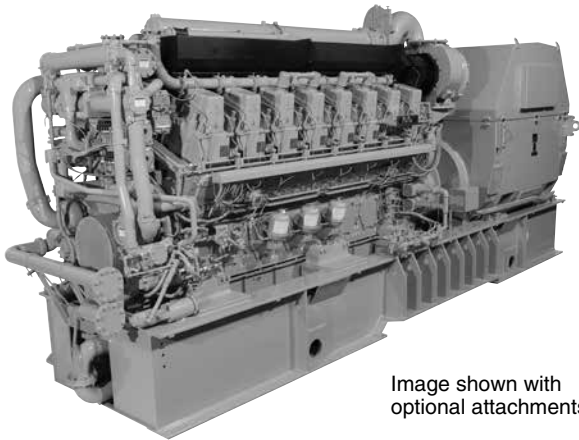


Image shown with optional attachments

### CAT® GENERATOR SET 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
Fuel System .....	EUI
Engine Control.....	Dual ADEM™ A4
Generator Set Control..	Cat® Alarm and Protection System
Refill Capacity	
Cooling System .....	1003 L (265 U.S. gal)
Lube Oil System .....	1677 L (443 U.S. gal)
Oil Change Interval.....	1000 hours

### FEATURES

#### Product Design

- Cat C280 engines are type approved by the following marine classification societies:
  - American Bureau of Shipping
  - Bureau Veritas
  - China Classification Society
  - Det Norske Veritas
  - Germanischer Lloyd
  - Lloyd's Register of Shipping
- IMO Tier II emissions certification, GL and CCS approved
- Cat alarm and protection system provides redundancy and the latest technology in generator set control, protection, and operator interface; type approved by the following marine classification societies:
  - American Bureau of Shipping
  - Bureau Veritas
  - China Classification Society
  - Det Norske Veritas
  - Germanischer Lloyd
  - Lloyd's Register of Shipping
  - Russian Maritime Register of Shipping

#### Simplified Packaging Concept

- Single-point AC and DC connection points at distribution panel
- Ready-to-run package, includes most ancillary equipment
- Single lift handling
- Few shipped-loose parts simplify handling at installation
- Caterpillar warranty covers all factory package components worldwide

#### 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.

#### Full Range of Attachments

Large variety of factory-installed engine attachments increases application flexibility and reduces installation time.

#### Testing

- Every unit is full-load tested to ensure proper package performance
- Full range of factory tests and reports are available including performance, torsional-vibration analysis, fuel consumption, engine, and generator special tests

#### Product Support Offered Through Global Cat Dealer Network

More than 2,200 dealer outlets  
Caterpillar factory-trained dealer technicians service every aspect of your Cat 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 and combustion by-products
- Site-specific oil change interval

#### Over 80 Years of Engine Manufacturing Experience

- C280 engines incorporate over 20 years of proven component reliability and durability from 3600 engines
- Large field population in offshore applications provides proven performance, reliability, durability, and established worldwide product support network

#### Web Site

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

## CONFIGURATION

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### Product Consist

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

### Air Inlet System

Fresh water aftercooler, corrosion resistant coated (air side); air inlet shutoff; crankcase breathers, top-mounted; turbochargers (2), rear-mounted, 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

Gear-driven jacket water (JW) pump, gear-driven separate-circuit aftercooler/oil cooler (AC/OC) pump, LH-mounted water connections: JW and AC/OC, 6" ANSI

### Exhaust System

Dry, gas tight exhaust manifold; dual turbocharger, rear-mounted; dual wastegate

### Fuel System

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

### Lube System

Centrifugal oil filters and lines with single shutoff – LH mounted on cylinder block inspection covers, serviceable with the engine running; oil pump, gear-driven; oil filler and dipstick – located in base integrated tank; oil pressure regulating valve; crankcase explosion relief valves; duplex oil filter – engine-mounted; oil cooler – engine-mounted

### Instrumentation

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
- All engine sensors are monitored by the ECU or the Cat Alarm and Protection System
- The panel can display all engine parameters

### Starting System

TDI dual air starting motors, LH rear; shutoff valve; two integrated relay valves with built-in screen #40 mesh and solenoid; air pressure sensor, monitored by Cat Alarm and Protection System – requires customer wiring; maximum operating (dynamic) pressure: 10 bar (150 psi); maximum static pressure: 14 bar (200 psi) 3-inch ANSI flange customer connection; requires customer-provided 3-inch supply air line from receiver or regulator to air starter and flex connection; if regulator is used, Cv of 40 or greater is required



## 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 Certifications

Societies currently granting approval to C280 engines are: ABS, BV, CCS, DnV, GL, LRS

### 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

### 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

\*Air cleaner support bracket

### Cooling System

Jacket Water Thermostat Options:

- 90°C thermostat, direct connection to expansion tank
- 90°C thermostat, for remote mounting
- 90°C thermostat, fully automatic 3-way with manual override
- Customer-provided thermostat

AC/OC Thermostat Options:

- 32°C thermostat, remote mounted
- 32°C thermostat, fully automatic, 3-way with manual override
- Customer-provided thermostat

Expansion Tank Options:

- Remote-mounted expansion tank
- Accessory-module-mounted expansion tank

\*Jacket water heaters

\*ANSI connection adapters

### Exhaust System

Exhaust manifold shields

\*Flexible exhaust fittings

\*Weld flanges

### Fuel System

\*Manual fuel priming pump

\*Duplex primary fuel strainer

### Lube System

Wet or dry oil sump

Redundant prelube with continuous electric prelube

Intermittent air prelube backup

Electric continuous prelube pump

\* Lube oil heater

\* Front or rear oil drain connections

### Protection System

Flywheel and damper guards

\*Cylinder pressure relief valve

\*Spray shielding

\*Oil mist detector

### Starting System

Pressure reducing valve

### Mounting System

Design-to-Order (DTO) Base

\*Vertically-restrained vibration isolators and weld plates

### General

Generator panel

Torsional coupling

Engine barring device options:

- Manual 50:1
- Electric 400V
- Electric 480V

\*Accessory module – Front-mounted for mounting expansion tank, heat exchanger, instrument panel, annunciator panel, alarm and shutdown contactors, and fuel strainer

\*Engine testing — full-load tested, fuel consumption test, rated speed performance test, overload test, minimum power setting, peak firing pressure test, turbo work certificates, crankshaft work certificates, standard and project-specific witness testing

\*Spare parts kit

\*Engine lifting eyes

### Literature

\*Project-specific installation drawings

\*Electrical schematics and P&ID drawings

\*Indicates an optional attachment



**DIESEL ENGINE TECHNICAL DATA**

**C280-16 Engine — 5420 bkW (1000 rpm)**

<b>Genset</b>	<b>50 Hz</b>		
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

**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 bkW (1000 rpm)**

ALTITUDE DERATION FACTORS													
AIR TO TURBO (°C)	50	ALTITUDE (METERS ABOVE SEA LEVEL)											
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750
45	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
	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
	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
	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
	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
	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
	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
20	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
	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

AFTERCOOLER HEAT REJECTION FACTORS													
AIR TO TURBO (°C)	50	ALTITUDE (METERS ABOVE SEA LEVEL)											
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750
45	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
	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
	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
	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
	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
	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
	1.00	1.00	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.13	1.16	1.19	1.21
20	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
	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.04	1.07	1.10	1.12	1.15	1.14

FREE FIELD MECHANICAL NOISE											
Nox as NO2 DISTANCE FROM THE ENGINE (M)	15M	7M	1M	SOUND PRESSURE LEVEL							
				dB(A)		dB					
				Overall	63	125	250	500	1000	2000	4000
	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		

Octave Band (Hz)

FREE FIELD EXHAUST NOISE											
DISTANCE FROM THE ENGINE (M)	15M	7M	1.5M	SOUND PRESSURE LEVEL							
				dB(A)		dB					
				Overall	63	125	250	500	1000	2000	4000
	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		

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%

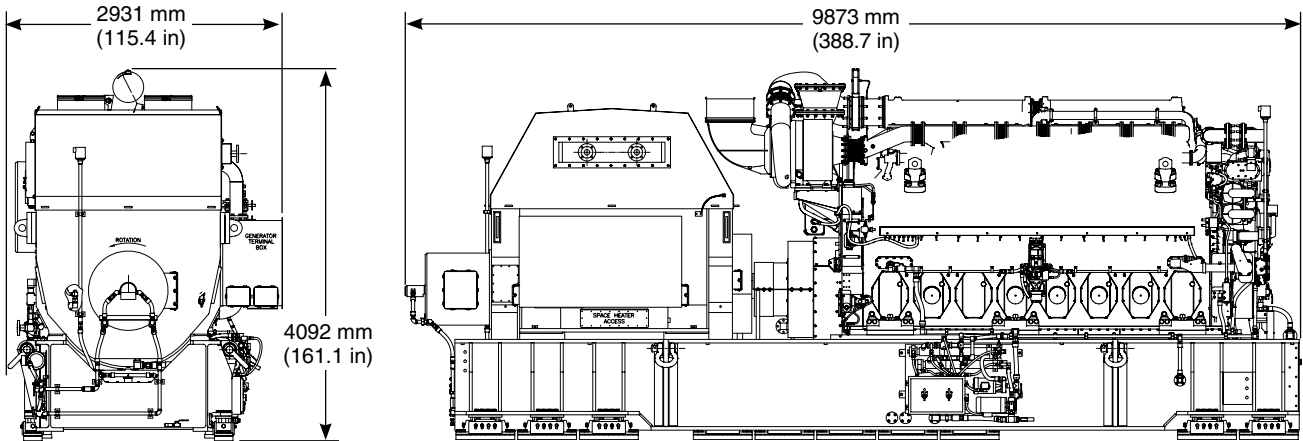
8) FUEL CONSUMPTION DATA IS WITHOUT SEA WATER PUMP.

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

**SOUND DATA:**

Data determined by methods according to TM7080.

## DIMENSIONS



Dimensions and Weight	
<b>Length</b>	9873 mm (388.7 in)
<b>Width</b>	2931 mm (115.4 in)
<b>Height</b>	4092 mm (161.1 in)
<b>Weight – dry</b>	64 000 kg (141,096 lb)

**Note:** Dimensions are dependent on generator and options selected. See general dimension 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.

**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.

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