



C280-12 Offshore Generator Set

3900 kW
4060 kW (5444 bhp)
50 Hz (1000 rpm)

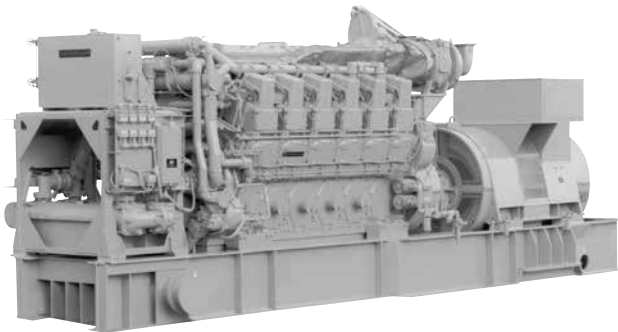


Image shown with
optional attachments

CAT® GENERATOR SET SPECIFICATIONS

V-12, 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	222 L (13,546 in ³)
Aspiration.	Turbocharged-Aftercooled
Fuel System.	EUI
Engine Control.	Dual ADEM™ A4
Generator Set Control . .	Cat® Alarm and Protection System
Refill Capacity	
Engine Cooling System	1245 L (329 U.S. gal)
Lube Oil System.	1283 L (339 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•SSM 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



CONFIGURATION

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

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****C280-12 Engine — 4060 kW (1000 rpm)****Genset 50 Hz**

ENGINE SPEED (rpm): 1000
COMPRESSION RATIO: 13:1
AFTERCOOLER WATER (°C): 32
JACKET WATER OUTLET (°C): 90
IGNITION SYSTEM: EUI
EXHAUST MANIFOLD: DRY
FIRING PRESSURE, MAXIMUM (kPa): 17300

CERTIFICATION: IMO II/EPA MARINE TIER II
TURBOCHARGER PART #: 189-4427
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)	kW	4466	4060	3045	2030
GENERATOR POWER	(2)	kW	4287	3898	2923	1949
BMEP		kPa	2418	2198	1649	1099
ENGINE EFFICIENCY (ISO 3046/1)	(1)	%	42.0%	42.1%	41.1%	38.8%
ENGINE EFFICIENCY (NOMINAL)	(1)	%	40.8%	40.9%	39.8%	37.6%

ENGINE DATA							
FUEL CONSUMPTION (ISO 3046/1)	(1)	g/bkW-hr	201.5	201.0	206.3	218.9	
FUEL CONSUMPTION (NOMINAL)	(1)	g/bkW-hr	205.4	204.9	210.3	223.1	
FUEL CONSUMPTION (90% CONFIDENCE)	(1)	g/bkW-hr	207.5	207.1	212.8	225.9	
AIR FLOW (@ 25°C, 101.3 kPa)		Nm ³ /min	436.1	409.4	335.1	253.5	
AIR MASS FLOW		kg/hr	29188	27399	22429	16966	
INLET MANIFOLD PRESSURE		kPa (abs)	372.5	348.9	284.6	215.7	
INLET MANIFOLD TEMPERATURE		°C	46.0	45.0	40.0	37.0	
EXHAUST STACK TEMPERATURE		°C	391.6	376.7	373.0	368.6	
EXHAUST GAS FLOW (@ stack temp, 101.3 kPa)		m ³ /min	939.7	876.2	702.9	529.8	
EXHAUST GAS MASS FLOW		kg/hr	30106	28231	23069	17419	

EMISSIONS "NOT TO EXCEED DATA"							
NOx (as NO ₂) + THC (molecular weight of 13.018)		g/bkW-hr	9.88	10.22	11.28	12.00	
NOx (as NO ₂)		g/bkW-hr	9.06	9.30	10.18	10.49	
CO		g/bkW-hr	0.98	0.66	0.75	1.13	
THC (molecular weight of 13.018)		g/bkW-hr	0.82	0.92	1.10	1.52	
Particulates		g/bkW-hr	0.18	0.21	0.34	0.92	

EMISSIONS "NOMINAL DATA"							
NOx (as NO ₂) + THC (molecular weight of 13.018)		g/bkW-hr	8.51	8.80	9.70	10.29	
NOx (as NO ₂)		g/bkW-hr	7.88	8.09	8.85	9.12	
CO		g/bkW-hr	0.75	0.51	0.58	0.87	
THC (molecular weight of 13.018)		g/bkW-hr	0.63	0.71	0.84	1.17	
Particulates		g/bkW-hr	0.13	0.15	0.24	0.66	

ENERGY BALANCE DATA							
FUEL INPUT ENERGY (LHV) (NOMINAL)	(1)	KW	10957	9938	7646	5393	
HEAT REJ. TO JACKET WATER (NOMINAL)	(3)	KW	859	806	676	533	
HEAT REJ. TO ATMOSPHERE (NOMINAL)	(4)	KW	219	199	153	108	
HEAT REJ. TO OIL COOLER (NOMINAL)	(5)	KW	422	398	342	287	
HEAT REJ. TO EXH. (LHV to 25°C) (NOMINAL)	(3)	KW	3475	3142	2523	1910	
HEAT REJ. TO EXH. (LHV to 177°C) (NOMINAL)	(3)	KW	2461	2392	1957	1515	
HEAT REJ. TO AFTERCOOLER (NOMINAL)	(6) (7)	KW	1492	1312	891	520	

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
C280-12 Engine — 4060 bkW (1000 rpm)

ALTITUDE DERATION FACTORS					IMO II/EPA MARINE TIER II									
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	3000
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
ALTITUDE (METERS ABOVE SEA LEVEL)														

FREE FIELD MECHANICAL NOISE											
SOUND PRESSURE LEVEL											
DISTANCE FROM THE ENGINE (M)	dB(A)	dB								dB	
		92	79.2	85.2	84.7	85.3	84.3	82.3	81		78.6
		98	94.7	90.7	90.2	90.8	89.8	87.8	86.5		84.1
		109	96.2	102.2	101.7	102.3	101.3	99.3	98		95.6
		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	SOUND PRESSURE LEVEL								dB dB dB dB(A)		
		dB(A)	dB									
			98	109.1	106.6	97.4	93.5	88.7	89.2		87.2	82.9
			105	116.4	113.4	104.2	99.9	95.0	96.4		84.8	90.2
			118	129.4	127.0	116.9	113.4	109.0	110.5		108.1	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:

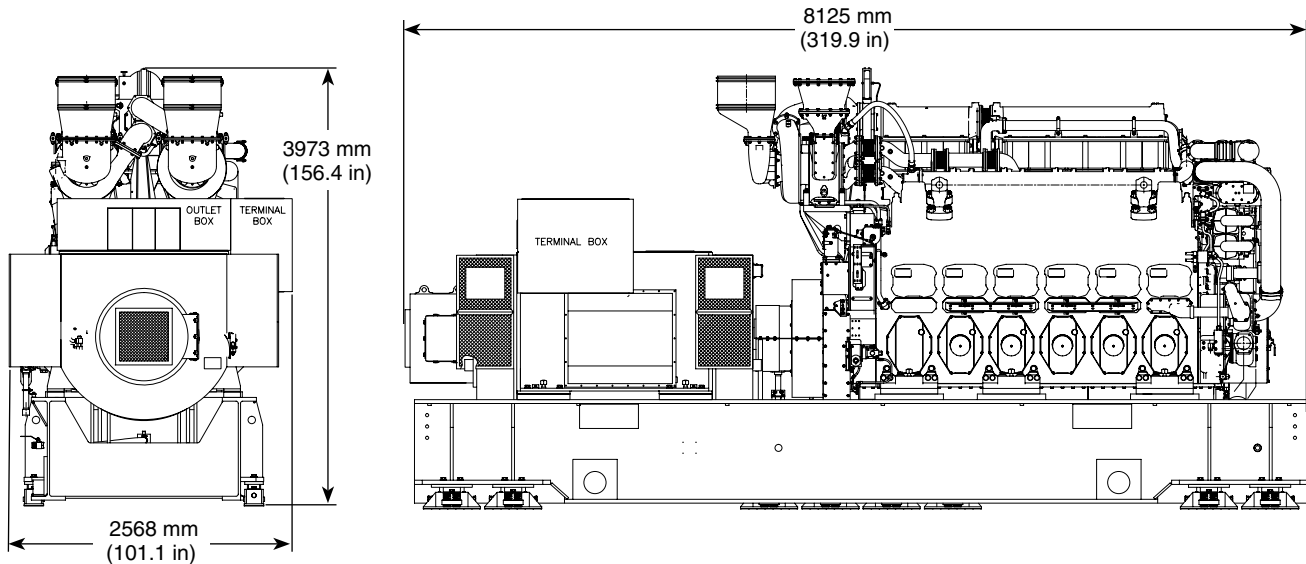
Generator power determined with an assumed generator efficiency of 96% [generator power = engine power x 0.96]. If the actual generator efficiency is less than 96% [and greater than 94.5%], the generator power [ekW] listed in the technical data can still be achieved. The BSFC values must be increased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

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

SOUND DATA:

Data determined by methods according to TM7080.

DIMENSIONS



Dimensions and Weight	
Length	8125 mm (319.9 in)
Width	2568 mm (101.1 in)
Height	3973 mm (156.4 in)
Weight – dry	56 500 kg (124,561 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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