



C280-16 Offshore Generator Set

5375 kW
5600 kW (7510 bhp)
60 Hz (900 rpm)

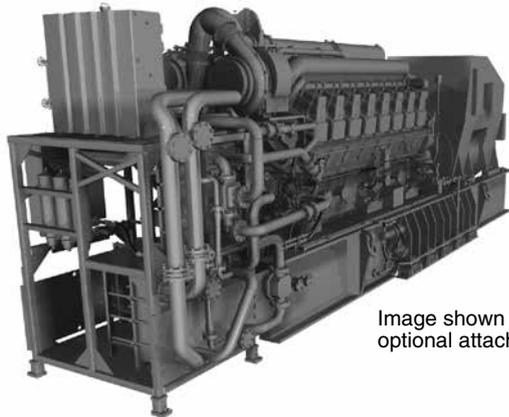


Image shown with optional attachments

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 ³)
Aspiration	Turbocharged-Aftercooled
Fuel System	EUI
Engine Control	Dual ADEM™ A4
Generator Set Control ..	Cat® Alarm and Protection System
Refill Capacity	
Cooling System	1245 L (329 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
- Optimized to lower specific fuel consumption at 35% load

Simplified Packaging Concept

- Front-mounted turbocharger configuration allows for simplified rig integration
- Engine design can take up to 38°C coolant to the aftercooler, allowing integration with flexible cooling system designs and reducing installation cost
- Single-point AC and DC connection points at distribution panel
- Ready-to-run package, includes most ancillary equipment
- Few shipped-loose parts simplify handling at installation
- Single-lift handling
- 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

Visit www.catoilandgasinfo.com to learn more.

CONFIGURATION

Product Consist

The engine is a turbocharged, aftercooled, four-stroke-cycle-diesel, 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), front-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), direct rack control

Cooling System

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

Exhaust System

Dry, gas tight exhaust manifold; dual turbocharger, front-mounted; dual wastegate; hard shielding – SOLAS compliant

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 – RH 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 – accessory module mounted; off engine-mounted oil cooler – DTO quote required for package connections; base integrated tank – DTO required

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

Redundant prelube with continuous electric prelube

Intermittent air prelube backup

Electric continuous prelube pump

* Lube oil heater

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 — 5600 bkW (900 rpm)

Genset	60 Hz	CERTIFICATION TARGET: IMO/EPA MARINE TIER II					
ENGINE SPEED (rpm):	900	TURBOCHARGER PART #:	362-8652				
COMPRESSION RATIO:	12.6 : 1	FUEL TYPE:	Distillate				
AFTERCOOLER WATER (°C):	38	RATED ALTITUDE @ 25°C (m):	200				
JACKET WATER INLET (°C):	90	ASSUMED GENERATOR EFFICIENCY (%):	96.0				
IGNITION SYSTEM:	EUI	ASSUMED GENERATOR POWER FACTOR:	0.8				
EXHAUST MANIFOLD:	DRY	MEAN PISTON SPEED (m/s):	9				
FIRING PRESSURE @ 100% load (kPa)	17300						

RATING	NOTES	LOAD	110%	100%	75%	50%
ENGINE POWER	(2)	bkW	6160	5600	4200	2800
GENERATOR POWER	(2)	ekW	5913	5375	4031	2688
BMEP		kPa	2780	2527	1895	1264
ENGINE EFFICIENCY (ISO 3046/1)	(1)	%	44.3%	44.0%	42.7%	41.5%
ENGINE EFFICIENCY (NOMINAL)	(1)	%	43.0%	42.7%	41.4%	40.2%

ENGINE DATA							
FUEL CONSUMPTION (ISO 3046/1)	(1)	g/bkW-hr	191.9	193.4	199.3	205.1	
FUEL CONSUMPTION (NOMINAL)	(1)	g/bkW-hr	195.6	197.2	203.2	209.1	
FUEL CONSUMPTION (90% CONFIDENCE)	(1)	g/bkW-hr	197.9	199.5	205.5	211.4	
AIR FLOW (@ 25C, 101.3kPa-a)		Nm ³ /min	549	510	464	318	
AIR MASS FLOW		kg/hr	36721	34138	31062	21295	
INLET MANIFOLD PRESSURE		kPa-a	415	384	349	237	
INLET MANIFOLD TEMPERATURE		deg C	45	44	42	39	
EXHAUST STACK TEMPERATURE		deg C	420	417	363	391	
EXHAUST GAS FLOW (@ stack temp, 101.3kPa-a)		m ³ /min	1191	1102	920	658	
EXHAUST GAS MASS FLOW		kg/hr	37926	35242	31915	21880	

EMISSIONS "NOT TO EXCEED DATA"							
NOx + HC		g/bkW-hr	12.77	12.03	8.48	8.59	
NOx		g/bkW-hr	12.16	11.67	8.11	8.13	
CO		g/bkW-hr	0.70	0.61	0.55	0.74	
HC		g/bkW-hr	0.61	0.36	0.37	0.46	
Particulates		g/bkW-hr	0.22	0.18	0.13	0.21	

EMISSIONS "NOMINAL DATA"							
NOx + HC		g/bkW-hr	11.04	10.42	7.33	7.43	
NOx		g/bkW-hr	10.57	10.14	7.05	7.07	
CO		g/bkW-hr	0.54	0.47	0.42	0.57	
HC		g/bkW-hr	0.47	0.28	0.29	0.35	
Particulates		g/bkW-hr	0.16	0.13	0.09	0.15	

ENERGY BALANCE DATA							
FUEL INPUT ENERGY (LHV) (NOMINAL)	(1)	kW	14321	13123	10142	6957	
HEAT REJ. TO JACKET WATER (NOMINAL)	(3)	kW	1083	984	800	622	
HEAT REJ. TO ATMOSPHERE (NOMINAL)	(4)	kW	344	338	266	229	
HEAT REJ. TO OIL COOLER (NOMINAL)	(5)	kW	565	542	459	382	
HEAT REJ. TO EXH (LHV to 25 deg C) (NOMINAL)	(3)	kW	4380	4036	3114	2321	
HEAT REJ. TO EXH (LHV to 177 deg C) (NOMINAL)	(3)	kW	2695	2471	1714	1358	
HEAT REJ. TO AFTERCOOLER (NOMINAL)	(6) (7)	kW	1789	1623	1303	603	
			14321	13123	10142	6957	

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)

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DIESEL ENGINE TECHNICAL DATA

C280-16 Engine — 5600 bkW (900 rpm)

ALTITUDE DERATION FACTORS														
AIR TO TURBO (°C)	50	0.98	0.96	0.91	0.88	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69	0.67
	45	1.00	0.98	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70	0.68
	40	1.00	1.00	0.94	0.91	0.89	0.86	0.83	0.81	0.78	0.76	0.74	0.71	0.69
	35	1.00	1.00	0.96	0.93	0.90	0.87	0.85	0.82	0.80	0.77	0.75	0.73	0.70
	30	1.00	1.00	0.98	0.94	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74	0.71
	25	1.00	1.00	1.00	0.96	0.93	0.90	0.88	0.85	0.82	0.80	0.77	0.75	0.73
	20	1.00	1.00	1.00	0.98	0.95	0.92	0.89	0.86	0.84	0.81	0.79	0.76	0.74
	15	1.00	1.00	1.00	0.99	0.96	0.93	0.91	0.88	0.85	0.83	0.80	0.78	0.75
	10	1.00	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	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
		0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000

ALTITUDE (METERS ABOVE SEA LEVEL)

FREE_FIELD MECHANICAL NOISE														
SOUND PRESSURE LEVEL dB(A)														
DISTANCE FROM THE ENGINE (M)	15M	94	82.2	88.2	87.7	88.3	87.3	85.3	84	81.6				
	7M	98	87.7	93.7	93.2	93.8	92.8	90.8	89.5	87.1				
	1M	109	98.7	104.7	104.2	104.8	103.8	101.8	100.5	98.1				
	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	99	109.6	106.7	98.4	93.1	88.7	89.2	87.3	81.9				
	7M	105	117.4	114.0	104.7	99.9	95.0	96.0	94.6	89.2				
	1.5M	119	129.9	128.5	118.3	113.5	109.1	110.5	108.1	102.3				
	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:

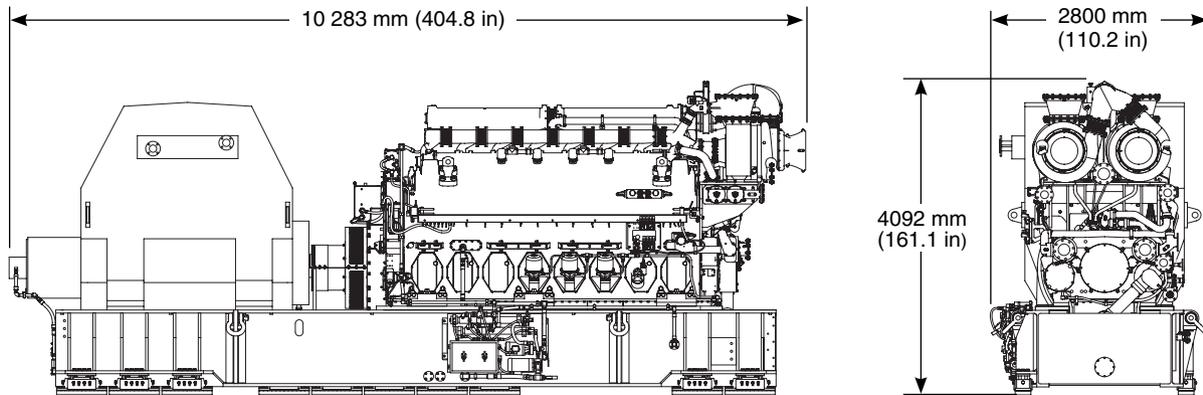
Aftercooler heat rejection is given for standard conditions of 25°C and 150 m altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric 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 similar to ISO Standard DIS-8528-10. Accuracy Grade 3.

DIMENSIONS


Dimensions and Weight		
Length	10 283 mm	404.8 in
Width	2800 mm	110.2 in
Height	4092 mm	161.1 in
Weight — dry	66 000 kg	145,505 lb

Note: Dimensions are dependent on generator and options. See general dimension drawings for details.

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 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 shown with all oil, fuel, and water pumps, engine driven.

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