C280-8 Offshore Generator Set

2420 ekW
2530 bkW (3393 bhp)
60 Hz @ 900 rpm

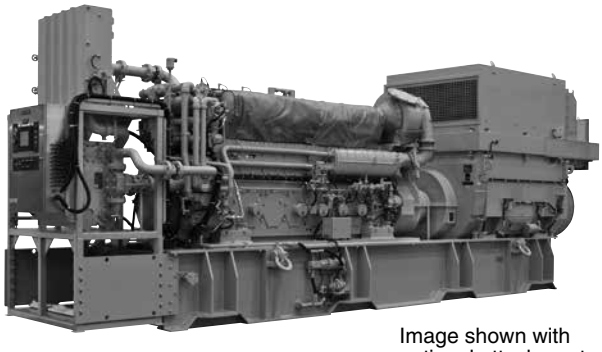

Image shown with optional attachments

CAT® ENGINE SPECIFICATIONS

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^3)
Aspiration	Turbocharged-Aftercooled
Governor and Protection	Electronic ADEM™ A3
Rated Speed	900 rpm
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℠ 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.

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

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 — 2530 bkW (900 rpm)

Genset	**60 Hz**
ENGINE SPEED (rpm):	900
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 #:	284-8281
FUEL TYPE:	Distillate
RATED ALTITUDE @ 25°C (m):	150
ASSUMED GENERATOR EFFICIENCY (%):	96
ASSUMED GENERATOR POWER FACTOR:	0.8
MEAN PISTON SPEED (m/s):	9

RATING		NOTES	LOAD	110%	100%	75%	50%
ENGINE POWER		(2)	bkW	2783	2530	1898	1265
GENERATOR POWER		(2)	ekW	2662	2420	1815	1210
BMEP			kPa	2512	2283	1712	1142
ENGINE EFFICIENCY	**(ISO 3046/1)**	**(1)**	**%**	**42.9%**	**43.5%**	**41.0%**	**39.2%**
ENGINE EFFICIENCY	(NOMINAL)	(1)	%	41.6%	42.2%	39.8%	38.0%

ENGINE DATA							
FUEL CONSUMPTION	**(ISO 3046/1)**	**(1)**	**g/bkw-hr**	**197.3**	**194.7**	**206.3**	**216.0**
FUEL CONSUMPTION	(NOMINAL)	(1)	g/bkw-hr	201.2	198.5	210.4	220.2
FUEL CONSUMPTION	(90% CONFIDENCE)	(1)	g/bkw-hr	203.2	200.7	212.9	223.0
AIR FLOW (@ 25°C, 101.3 kPaa)			Nm3/min	276.3	240.5	203.6	130.6
AIR MASS FLOW			kg/hr	18491	16095	13630	8743
INLET MANIFOLD PRESSURE			kPa (abs)	409.9	360.6	304.7	198.2
INLET MANIFOLD TEMPERATURE			°C	44.3	42.8	38.6	35.9
EXHAUST STACK TEMPERATURE			°C	368.1	361.3	377.8	442.3
EXHAUST GAS FLOW (@ stack temp, 101.3 kPa)			m3/min	569.3	512.4	364.4	243.1
EXHAUST GAS MASS FLOW			kg/hr	18239	16510	11959	7993

EMISSIONS "NOT TO EXCEED DATA"						
NOx (as NO) + THC (molecular weight of 15.84)	g/bkW-hr	8.34	8.51	9.12	9.01
NOx (as NO)	g/bkW-hr	7.73	7.86	8.37	8.03
CO	g/bkW-hr	0.39	0.46	0.52	1.33
THC (molecular weight of 15.84)	g/bkW-hr	0.61	0.64	0.75	0.98
Particulates	g/bkW-hr	0.19	0.23	0.26	0.40

EMISSIONS "NOMINAL DATA"						
Nox as NO2 + THC (molecular weight of 15.84)	g/bkW-hr	7.19	7.34	7.86	7.74
Nox as NO2	g/bkW-hr	6.72	6.84	7.28	6.99
CO	g/bkW-hr	0.30	0.35	0.40	1.02
THC (molecular weight of 15.84)	g/bkW-hr	0.47	0.50	0.58	0.75
Particulates	g/bkW-hr	0.14	0.16	0.18	0.28

ENERGY BALANCE DATA							
FUEL INPUT ENERGY (LHV)	(NOMINAL)	(1)	KW	6686	5998	4767	3330
HEAT REJ. TO JACKET WATER	(NOMINAL)	(3)	KW	547	515	433	343
HEAT REJ. TO ATMOSPHERE	(NOMINAL)	(4)	KW	134	120	95	67
HEAT REJ. TO OIL COOLER	(NOMINAL)	(5)	KW	270	255	221	187
HEAT REJ. TO EXH. (LHV to 25°C)	(NOMINAL)	(3)	KW	2034	1791	1555	1205
HEAT REJ. TO EXH. (LHV to 177°C)	(NOMINAL)	(3)	KW	1618	1477	1177	691
HEAT REJ. TO AFTERCOOLER	(NOMINAL)	(6) (7)	KW	905	775	554	256

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.

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DIESEL ENGINE TECHNICAL DATA

C280-8 Engine — 2530 bkW (900 rpm)

ALTITUDE DERATION FACTORS

AIR TO TURBO (°C)	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
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

ALTITUDE (METERS ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AIR TO TURBO (°C)	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
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 dB(A)

DISTANCE FROM THE ENGINE (M)	Overall	63	125	250	500	1000	2000	4000	8000
15M	92	90.7	87.6	86.8	87.1	88.3	84	80	72
7M	97	96.2	93.1	92.3	92.6	93.8	89.5	85.5	77.5
1M	108	107.2	104.1	103.3	103.6	104.8	100.5	96.5	88.5

Octave Band (Hz)

FREE_FIELD EXHAUST NOISE

SOUND PRESSURE dB(A)

DISTANCE FROM THE ENGINE (M)	Overall	63	125	250	500	1000	2000	4000	8000
15M	97	107.6	104.7	96.4	91.1	86.7	87.2	85.3	79.9
7M	103	115.4	112.0	102.7	97.9	93.0	94.0	92.6	87.2
1.5M	117	127.9	126.5	116.3	111.5	107.1	108.5	106.1	100.3

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.

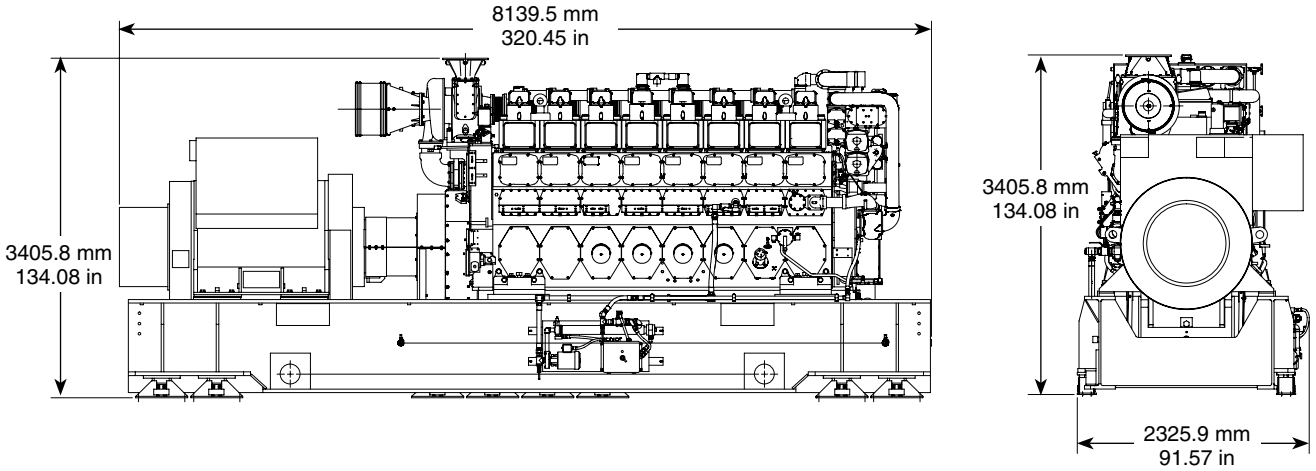
GENERATOR EFFICIENCY:
Generator power determined with an assumed generator effeciency of 96% [generator power = engine power x 0.96]. If the actual generator efficiency is less than 96% [and greater than 94.5%], the generator power [ekW] listed in the technical data can still be achieved. The BSFC values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

C280-8 OFFSHORE GENERATOR SET

2420 ekW
2530 bkW (3393 bhp)

DIMENSIONS



Dimensions and Weight		
Length	8139.5 mm	320.45 in
Width	2325.9 mm	91.57 in
Height	3405.8 mm	134.08 in
Weight – dry	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.

Performance Number: DM8402-02
LEHW0092-03 (3-13)