

# C7.1

MARINE PROPULSION ENGINE

PRELIMINARY



317, 298, 261, 209 kW (425, 400, 350, 280 bhp) @ 2700, 2600, 2500, 2300 rpm

Heat Exchanger Cooled-Sea Water Aftercooled & Keel Cooled

(Performance Data Published at Maximum Limits at Rated Speed)

## GENERAL ENGINE SPECIFICATIONS

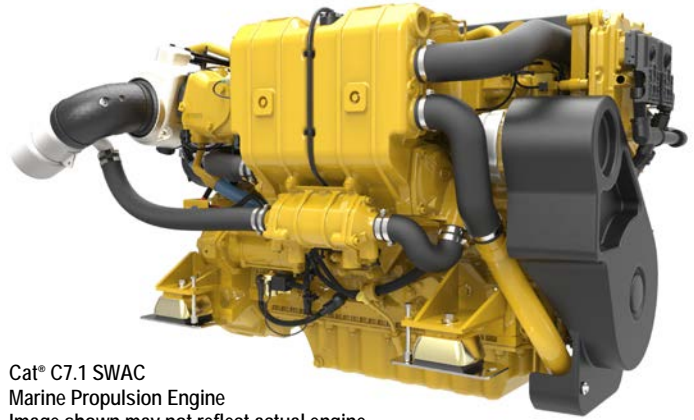
### Basic Engine Specifications

I-6, 4-Stroke-Cycle-Diesel

Displacement	7.01 L (428 in <sup>3</sup> )
Rated engine speed	2700, 2600, 2500, 2300 rpm
Target speed at sea trial	Rated Speed +/- 2% rpm
High idle speed	Rated Speed +10% rpm
Low idle speed (programmable)	600-800 rpm
Peak torque	1382 Nm @ 1900 rpm (317 kW)
	1019 ft-lb @ 1900 rpm (425 HP)
	1357 Nm @ 1900 rpm (298 kW)
	1001 ft-lb @ 1900 rpm (400 HP)
	1231 Nm @ 1800 rpm (261 kW)
	908 ft-lb @ 1800 rpm (350 HP)
	1098 Nm @ 1800 rpm (209 kW)
	810 ft-lb @ 1800 rpm (280 HP)
Bore	105 mm (4.13 in)
Stroke	135 mm (5.31 in)
Aspiration	Turbocharged-Aftercooled
Governor	ECU
Fuel system type	Common Rail
Length	1095 mm (43.1 in)
Width	798 mm (31.4 in)
Height	876 mm (34.5 in)
Weight, net dry (approx.)	760 kg (1676 lb)
Rotation (from flywheel end)	Counterclockwise
Flywheel housing	SAE No. 03M
Flywheel	SAE 11.5" with 126 teeth

### Tolerances

Power	+/- 3%
Exhaust Stack Temperature	+/- 8%
Inlet Air Flow	+/- 5%
Intake Manifold Pressure	+/- 10%
Exhaust Flow	+/- 6%
Specific Fuel Consumption	+/- 3%
Heat Rejection	+/- 5%
Fuel Rate	+/- 5%



Cat® C7.1 SWAC  
Marine Propulsion Engine  
Image shown may not reflect actual engine

### Emission Compliance

#### Recreational

EPA Tier 3 (E3 Cycle)  
IMO II (EPA, GL, CCS)  
Recreational Craft Directive (EU) RCD 2016

#### Commercial

EPA Tier 3 (E3 Cycle)  
EU Stage IIIA  
IMO II (EPA, GL, CCS)  
CCNR Stage II through reciprocity with EU Stage IIIA

### Power Output Considerations

Power produced at the flywheel will be within standard tolerances up to 50°C (122°F) combustion air temperature measured at the turbocharger air compressor inlet, sea water temperature up to 32°C (89.6°F), and fuel temperature up to 40°C (104°F) measured at the engine inlet. Power rated in accordance with NMMA procedure as crankshaft power. All power and fuel consumption declarations in this specification sheet are raw (uncorrected).

### General Remarks

- For installation instructions please refer to Project Guide.
- For detailed information about fuel, oil, and cooling water treatment, please refer to "Caterpillar Commercial Diesel Engine Fluids Recommendations" (SEBU6251).

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## AIR SYSTEM

### Combustion Air Inlet System

Intake combustion air flow.....	21.7 m <sup>3</sup> /min (317bkW), 20.8 m <sup>3</sup> /min (298bkW), 19.7 m <sup>3</sup> /min (261bkW), 16.7 m <sup>3</sup> /min (209bkW)
Intake combustion air flow.....	766.2 cfm (425HP), 734.6 cfm (400HP), 695.7 cfm (350HP) 589.8 cfm (280HP)
Intake combustion air temperature up to.....	50°C (122°F)
Max. allowable intake air restriction .....	6.5 kPa (26 in H <sub>2</sub> O)

### Engine Room Ventilation Air

Heat rejection to atmosphere .....	22.8 kW (317bkW), 20.3kW (298bkW), 15.0kW (261bkW), 10.8kW (209bkW) @ 25°C ambient temperature
Heat rejection to atmosphere .....	1297 BTU/min (425HP), 1154 BTU/min (400HP) @ 77°F ambient temperature
Heat rejection to atmosphere .....	853 BTU/min (350HP), 614 BTU/min (280HP) @ 77°F ambient temperature

## FUEL SYSTEM

Fuel flow supply line (max).....	270 L/hr (71.3 gal/hr)
Fuel flow return line (max).....	270 L/hr (71.3 gal/hr)
Fuel rate at rated speed .....	84.9 L/hr (317bkW), 79.5 L/hr (298bkW), 68.7 L/hr (261bkW), 56.3 L/hr (209bkW)
Fuel rate at rated speed .....	18.7 gal/hr (425HP), 17.5 gal/hr (400HP), 15.1 gal/hr (350HP), 12.4 gal/hr (280HP)
Total fuel supply restriction (max.) .....	30 kPa (8.9 in Hg) (4.4 psi)
Fuel restriction across primary fuel filter (clean) .....	3.5 kPa (1.0 in Hg) (0.5 psi)
Fuel temperature engine inlet (max.) .....	60°C (140°F)
Fuel return line restriction (max.) .....	37 kPa (10.9 in Hg) (5.4 psi)
Fuel supply/return connection .....	3/4"-16 SAE J514 (-8), 37° FLARE
.....	13/16"-16 STOR (optional)
Minimum fuel supply line inside diameter .....	SAE -8 (12.7mm) (1/2 in)
Primary fuel filter inlet/outlet connection .....	3/4"-16 SAE J514 (-8), 37° FLARE
Diesel fuel grade .....	US Diesel #2 / EN590 / Biodiesel 20% max

## EXHAUST SYSTEM

### Exhaust Gas Data

Exhaust gas flow (total).....	1739 kg/hr (317bkW), 1665 kg/hr (298bkW), 1577 kg/hr (261bkW), 1334 kg/hr (209bkW)
Exhaust gas flow (total).....	3826 lb/hr (425HP), 3663 lb/hr (400HP), 3469 lb/hr (350HP), 2935 lb/hr (280HP)
Exhaust stack temperature .....	475°C (317bkW), 457°C (298bkW), 405°C (261bkW), 403°C (209bkW)
Exhaust stack temperature .....	887°F (450HP), 855°F (400HP), 761°F (350HP), 757°F (280HP)
Max. allowable system backpressure .....	15 kPa (60.2 in H <sub>2</sub> O)
Max. allowable static weight on turbine outlet.....	0 kg (0 lb)
Max. allowable static bending moment on turbine outlet .....	0 Nm (0 ft-lbs)

*Specified system backpressure shall not be exceeded in any circumstances. Caterpillar advises to limit value of maximum allowable backpressure to 50% for new (clean) installations. Minimum diameter of customer piping should be according to "Customer piping diameter overview for Caterpillar engines."*

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Power produced at the flywheel will be within standard tolerances up to 50°C (122°F) combustion air temperature measured at the air cleaner inlet, and fuel temperature up to 40°C (104°F) measured at the engine inlet. Power rated in accordance with NMMA procedure as crankshaft power. Reduce crankshaft power by 3% for propeller shaft power.

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Performance No : EM6000, EM6001, EM6002, EM6003, EM6004, EM6005

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## COOLING SYSTEM

### HTC Cooling Water System (Engine Jacket Water)

Heat rejection to HTC cooling water system .....	225 kW (317bkW), 213 kW (298bkW), 185 kW (261bkW), 158kW (209bkW)
Heat rejection to HTC cooling water system .....	12,796 BTU/min (425HP), 12,113 BTU/min (400HP), 10,521 BTU/min (350HP), 8985 BTU/min (280HP)
Flow HTC cooling water pump (nominal) .....	450 L/min (317bkW), 440 L/min (298bkW), 430L/min (261bkW), 395L/min (209bkW)
Flow HTC cooling water pump (nominal) .....	98.9 gal/min (425HP), 96.8gal/min (400HP), 94.6gal/min (350HP), 86.9gal/min (280HP)
HTC cooling water temperature engine out (max) .....	92°C (203°F)
HTC cooling water refill capacity (Keel Cooled Only) .....	38 L (10 gal)
Coolant medium .....	Cat® Extended Life Coolant (ELC) or equal. 50% Glycol.
Expansion tank pressure cap .....	100 kPa (14.5 psi)
HTC cooling water connection engine inlet .....	50.8 mm (2.0 in.) OD
HTC cooling water connection engine outlet .....	50.8 mm (2.0 in.) OD

### LTC Cooling Water System (Aftercooler)

Heat rejection to LTC cooling water system .....	58.2kW (317bkW), 55.2kW (298bkW), 50.8kW (261bkW), 38.5kW (209bkW)
Heat rejection to LTC cooling water system .....	3310 BTU/min (425HP), 3139 BTU/min (400HP), 2889 BTU/min (350HP), 2189 BTU/min (280HP)
Flow LTC cooling water pump (nominal) .....	210 L/min (317bkW), 200 L/min (298bkW), 195 L/min (261bkW), 180L/Min (209bkW)
Flow LTC cooling water pump (nominal) .....	46.2 gal/min (425HP), 44.0 gal/min (400HP), 42.9 gal/min (350HP), 39.6 gal/min (280HP)
LTC water temperature engine in (27°C Sea) .....	44°C (317bkW), 45°C (298bkW), 46°C (261bkW), 50°C (209bkW)
LTC water temperature engine in (81°F Sea) .....	111°F (425HP), 113°F (400HP), 115°C (350HP), 122°C (280HP)
LTC cooling water refill capacity .....	5 L (1.3 gal) <i>Engine only</i>
Coolant medium .....	Cat Extended Life Coolant (ELC) or equal. 50% Glycol.
Expansion tank pressure cap .....	100 kPa (14.5 psi)
LTC cooling water connection engine inlet (138) .....	50.8 mm (2.0 in.) OD
LTC cooling water connection engine outlet (139) .....	50.8 mm (2.0 in.) OD

### Raw Water Cooling System (SWAC)

Cooling water refill capacity .....	43 L (11.4 gal)
Coolant medium .....	Cat® Extended Life Coolant (ELC) or equal. 50% Glycol
Expansion tank pressure cap .....	100 kPa (14.5 psi)
Heat rejection to raw water cooling system .....	283 kW (317bkW), 268 kW (298bkW), 236 kW (261bkW), 197kW (209bkW)
Heat rejection to raw water cooling system .....	16,094 BTU/min (425HP), 15,241 BTU/min (400HP), 13,421 BTU/min (350HP), 11,203 BTU/min (280HP)
Flow Raw Water Pump (nominal) .....	210 L/min (317bkW), 200 L/min (298bkW), 195 L/min (261bkW), 180L/Min (209bkW)
Flow Raw Water Pump (nominal) .....	46.2 gal/min (425HP), 44.0 gal/min (400HP), 42.9 gal/min (350HP), 39.6 gal/min (280HP)
Raw water pump maximum inlet restriction .....	2.0 m (6.6 ft) H <sub>2</sub> O
Raw water temperature engine out to gear oil cooler (27°C Sea) .....	46.3°C (317bkW), 46.1°C (298bkW), 44.3°C (261bkW), 42.6°C (209bkW)
Raw water temperature engine out to gear oil cooler (81°F Sea) .....	115.3°F (425HP), 115.0°F (400HP), 11.7°F (350HP), 108.7°F (280HP)
Gear oil cooler 473-0282 heat rejection capability .....	11.2 kW (636.9 BTU/min)
Raw water connection engine inlet .....	50.8 mm (2.00 inch) SAE J1231 Hose Connection
Raw water connection engine outlet .....	45 mm (1.77 inch) SAE J1231 Hose Connection
Sea water strainer mesh hole diameter (max) .....	1.6 mm (0.063 in)

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## LUBE SYSTEM

Sump type .....	Center Sump
Sump capacity.....	20 L (5.3 gal)
Oil change interval.....	500 Hr <i>(may be modified by S-O-S<sup>SM</sup> testing)</i>
Max. installation angle (fore-aft).....	10 degrees
Max. operating angle (fore-aft).....	20 degrees
Max. operating angle (athwart ship).....	30 degrees
Quality diesel engine oil (min.).....	CI-4 10W30 or 15W40 <i>(compliant with Caterpillar specification ECF-2)</i>

## STARTING SYSTEM

### Electrical Starting System

Electrical starting motor .....	24 VDC, 12 VDC
Cold starting .....	520 CCA (24VDC), 520 CCA (12VDC) <i>[at -5°C (23°F) ambient temperature]</i>
Recommended battery capacity.....	2 x 100 Ah, series (24VDC), 2 x 100Ah, parallel (12VDC)

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