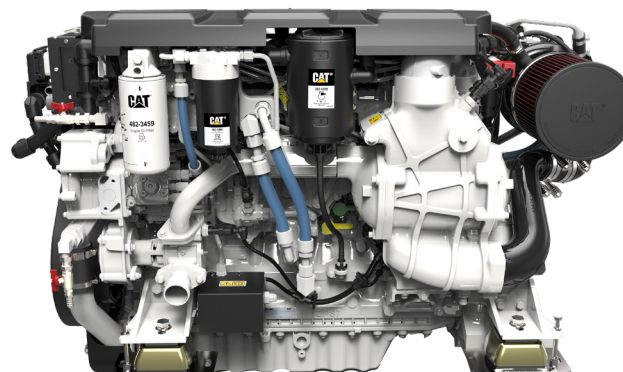
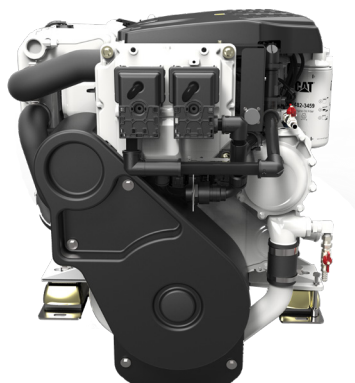


C7.1 Marine Propulsion Engine

High Performance Applications



ENGINE SPECIFICATIONS

CONFIGURATION	In-line 6, 4-stroke cycle diesel
EMISSIONS	U.S. EPA Tier 3, IMO II, RCD II, China II
RATED ENGINE SPEED	2900 rpm
DISPLACEMENT	7.01 L (428 cu in)
ASPIRATION	Turbocharged - aftercooled
GOVERNOR	Electronic (A5E2 V2 ECM)
FLYWHEEL HOUSING	SAE No. 03

BORE x STROKE	105 mm x 135 mm / 4.13 in x 5.31 in
REFILL CAPACITY LUBE OIL SYSTEM W/ OIL FILTER CHANGE	20 L (5.3 gal)
OIL CHANGE INTERVAL	250 hrs
ROTATION (from flywheel end)	Counterclockwise from the flywheel end
COOLING	Heat Exchanger Cooled

KEY FEATURES & BENEFITS

- Common rail fuel system enables optimum combustion and low emissions
- Reduced combustion noise through advanced electronic control
- 12V or 24V electrical system
- Compatible with Cat® displays and electronics
- Closed crankcase ventilation system improves engine room cleanliness
- Gear-driven jacket water pump and sea water pump for superior reliability
- Maintenance free valve train with hydraulic valve lash adjusters
- Self-priming fuel system ensures a smooth start every time

STANDARD EQUIPMENT

- Water cooled turbocharger and exhaust manifold
- Common rail fuel system
- Corrosion resistant sea water aftercooler
- Closed crankcase ventilation system
- Starter motors – 12V or 24V
- Fuel cooler
- Integral engine oil cooler
- Vibration damper and guard
- Electric fuel priming pump
- Self-tensioning multi-vee alternator drive belt
- Gear driven sea water pump (rubber impeller)
- Fin and tube type jacket water heat exchanger
- Front and rear engine mounting brackets

OPTIONAL ATTACHMENTS

- Alternators
 - 24V 140 amp – 12V 175 amp
- Transmission gear oil cooler (engine mounted)
- Instrument panels
- Glow plugs
- Jacket water heater
- 6" water cooled exhaust elbow
- Isolation mounts
- Primary fuel filter/water separator (remote mount)
- Selection of factory-fitted marine transmissions and oil hoses
- Cabin heater (calorifier) connections
- Triple groove PTO pulley (crankshaft mounted)
- Flexible fuel hoses
- Right-hand and high level left hand oil dipsticks

RATINGS & FUEL CONSUMPTION - PROPULSION ENGINES

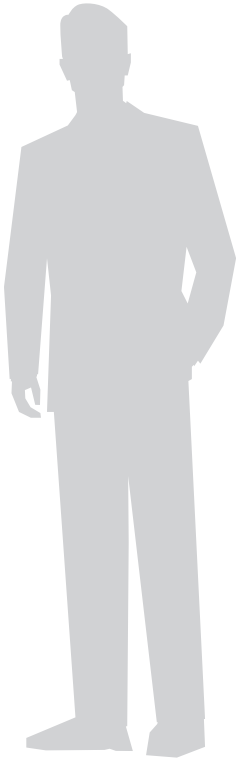
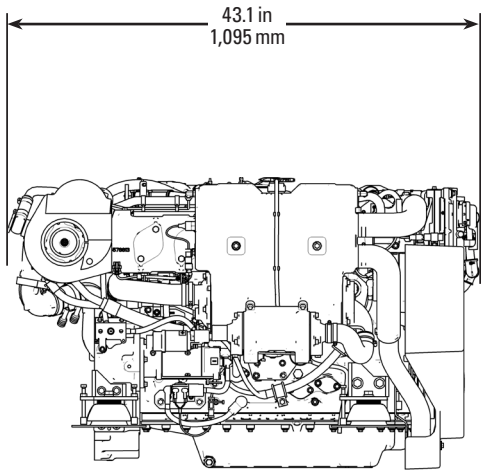
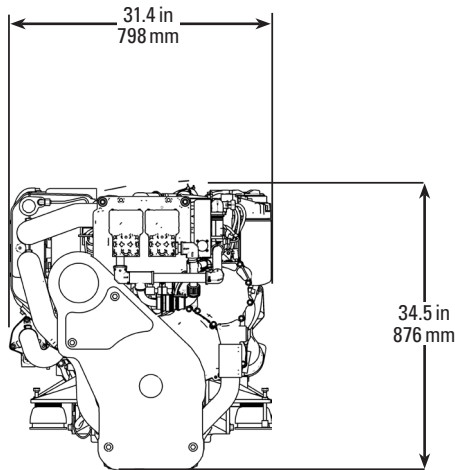
Rating	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	IMO	U.S. EPA	EU	China
E	406	400	298	2900	21.8	220.5	II	T3R	RCD	C-II
E	456	450	336	2900	24.4	219.9	II	T3R	RCD	C-II
E	507	500	373	2900	27.3	221.0	II	T3R	RCD	C-II

Remarks, e.g. footnotes, references
ISO 3046/1 BSFC tolerance of -0/+5%

Rating Definitions
E Rating (High Performance): For vessels operating at rated load and rated speed up to 8% of the time (up to 30% load factor).
Typical operation ranges from 250 to 1000 hours per year

ENGINE DIMENSIONS & WEIGHT

LENGTH	43.1 in / 1,095 mm
HEIGHT	34.5 in / 876 mm
WIDTH	31.4 in / 798 mm
DRY WEIGHT	1,676 lb / 760 kg



Contact your local Cat® Dealer
for more information!



C7.1

MARINE PROPULSION ENGINE



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

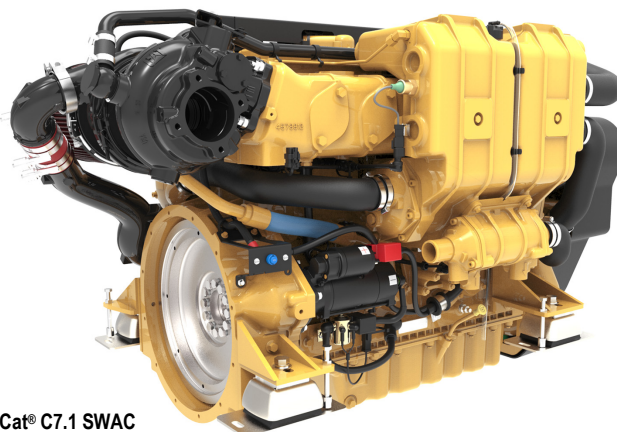
Basic Engine Specifications

I-6, 4-Stroke-Cycle-Diesel

Displacement	7.01 L (428 in ³)
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. 03
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)
IMO II (EPA, GL, CCS)

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).

AIR SYSTEM

Combustion Air Inlet System

Intake combustion air flow.....	24.2 m ³ /min (317bkW), 24.3 m ³ /min (298bkW), 23.2 m ³ /min (261bkW), 19.9 m ³ /min (209bkW)
Intake combustion air flow.....	853.7 cfm (425HP), 858.5 cfm (400HP), 817.7 cfm (350HP) 701.6 cfm (280HP)
Intake combustion air temperature up to.....	50°C (122°F)
Max. allowable intake air restriction	6.5 kPa (26 in H ₂ O)

Engine Room Ventilation Air

Heat rejection to atmosphere	9.8 kW (317bkW), 9.5kW (298bkW), 9.3kW (261bkW), 9.2kW (209bkW) @ 25°C ambient temperature
Heat rejection to atmosphere	556 BTU/min (425HP), 538 BTU/min (400HP) @ 77°F ambient temperature
Heat rejection to atmosphere	528 BTU/min (350HP), 521 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	86.5 L/hr (317bkW), 76.9 L/hr (298bkW), 69.2 L/hr (261bkW), 56.3 L/hr (209bkW)
Fuel rate at rated speed	22.9 gal/hr (425HP), 20.3 gal/hr (400HP), 18.3 gal/hr (350HP), 14.9 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)	1741 kg/hr (317bkW), 1745 kg/hr (298bkW), 1658 kg/hr (261bkW), 1420 kg/hr (209bkW)
Exhaust gas flow (total)	3839 lb/hr (425HP), 3848 lb/hr (400HP), 3655 lb/hr (350HP), 3131 lb/hr (280HP)
Exhaust stack temperature	476°C (317bkW), 427°C (298bkW), 380°C (261bkW), 373°C (209bkW)
Exhaust stack temperature	888°F (450HP), 801°F (400HP), 716°F (350HP), 703°F (280HP)
Max. allowable system backpressure	15 kPa (60.2 in H ₂ 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	239 kW (317bkW), 223 kW (298bkW), 189 kW (261bkW), 164kW (209bkW)
Heat rejection to HTC cooling water system	13,595 BTU/min (425HP), 12,698 BTU/min (400HP), 10,754 BTU/min (350HP), 9314 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	50 kPa (7.25 psi)
HTC cooling water connection engine inlet	57 mm (2.25 in.) OD
HTC cooling water connection engine outlet	57 mm (2.25 in.) OD

LTC Cooling Water System (Aftercooler)

Heat rejection to LTC cooling water system	59.1kW (317bkW), 55.4kW (298bkW), 50.0kW (261bkW), 36.5kW (209bkW)
Heat rejection to LTC cooling water system	3359 BTU/min (425HP), 3151 BTU/min (400HP), 2846 BTU/min (350HP), 2074 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	50 kPa (7.25 psi)
LTC cooling water connection engine inlet (138)	45 mm (1.75 in.) OD
LTC cooling water connection engine outlet (139)	45 mm (1.75 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	295 kW (317bkW), 276 kW (298bkW), 239 kW (261bkW), 197kW (209bkW)
Heat rejection to raw water cooling system	16,722 BTU/min (425HP), 15,670 BTU/min (400HP), 13,542 BTU/min (350HP), 11,165 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 ₂ O
Raw water temperature engine out to gear oil cooler (27°C Sea)	47.1°C (317bkW), 46.7°C (298bkW), 44.6°C (261bkW), 42.6°C (209bkW)
Raw water temperature engine out to gear oil cooler (81°F Sea)	116.8°F (425HP), 116.1°F (400HP), 112.3°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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C7.1

MARINE PROPULSION ENGINE



LUBE SYSTEM

Sump type	Center Sump
Sump capacity	20 L (5.3 gal)
Oil change interval	500 Hr (may be modified by S•O•S SM testing)
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 (compliant with Caterpillar specification ECF-2)

STARTING SYSTEM

Electrical Starting System

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

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