



3512B Offshore Emergency Generator Set

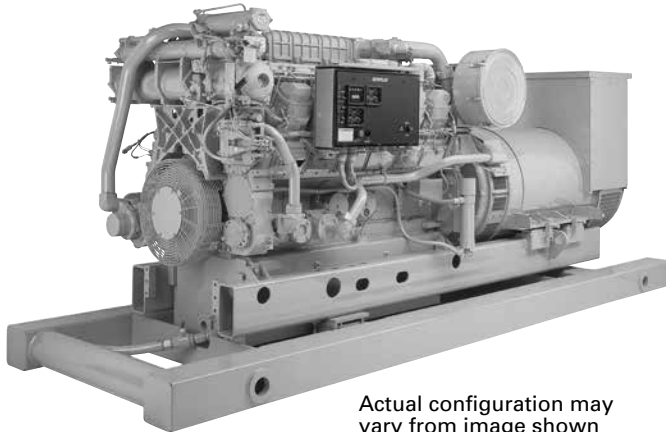
1360 ekW (1943 kVA)
1424 bkW (1910 bhp)
60 Hz (1800 rpm)

CAT® ENGINE SPECIFICATIONS

V-12, 4-Stroke-Cycle-Diesel

Emissions	IMO Tier I
Bore	170 mm (6.7 in)
Stroke	190 mm (7.5 in)
Displacement	52 L (3175 in ³)
Aspiration	Turbocharged-Aftercooled
Governor and Protection	Electronic ADEM™ A3
Refill Capacity	
Lube Oil System (refill) ¹	318 L (84 U.S. gal)
Engine Cooling System	401 L (106 U.S. gal)
Oil Change Interval	1000 hours

¹500-hour oil pan available



Actual configuration may vary from image shown

FEATURES

Engine Design

- Proven reliability and durability in demanding petroleum offshore applications
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Fast pick-up and load acceptance
- Assembled, tested, and validated as a package to minimize package vibration and maximize component life
- Direct injection electronic unit injectors precisely meter fuel and provide excellent fuel economy
- Proven generator selected to meet the demands and harsh conditions found in the offshore environment
- Market-leading power density
- Long overhaul life proven in oilfield applications
- Core engine components designed for reconditioning and reuse at overhaul
- Optional IMO certificate by GL or CCS is available for non-U.S. flag vessels
- DNV, ABS, or GL marine society type approved coupling
- Offshore electric drive ratings include 10% overload capacity to meet most marine society approvals

Ease of Installation

Separate-circuit aftercooler for ease of installation
Offshore package provides single lift handling to reduce the shipyard scope of work complexity

Safety

- ADEM A3 monitoring system provides engine deration, alarm, or shutdown strategies to protect against adverse operating conditions. Selected parameters are customer programmable.
- E-stop pushbutton on instrument panel
- Air shutoff and explosion relief valves
- Configurable alarm and shutdown features
- Extra alarm switches available for customer-supplied panel

Improved Serviceability

Large inspection openings allow convenient access to core engine internals

Reduction of Owning and Operating Costs

- Long filter change intervals, aligned with service intervals
- Excellent fuel economy — direct injection electronic unit injectors precisely meter fuel

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.

Testing

Every Cat 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•SSM 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.
- Manufacturing of cast engine blocks, heads, cylinder liners, and flywheel housings
- Machining of critical components
- Complete engine assembly

Web Site

For all your petroleum power requirements, visit www.catoilandgasinfo.com.

**STANDARD EQUIPMENT****Air Inlet System**

Aftercooler core, corrosion resistant coated (air side)
Air cleaner, regular duty, with soot filter
Dual turbochargers, 152 mm (6") OD straight connection
Service indicators

Control System

Caterpillar ADEM A3 electronic engine control, LH
Requires 24V DC 10 amp continuous, 20 amp intermittent,
clean electrical power

Cooling System

In order to ensure compliance in use, optional or customer-supplied heat exchangers or radiators must be capable of rejecting enough heat to allow proper operation at worst case site conditions, and also must supply 140°F (60°C) SCAC cooling water to the aftercooler inlet, with an SCAC flow rate of at least 130 GPM with an ambient temperature of 86°F (30°C) and at-site conditions (including altitude considerations).

Engine Configuration for Remote Radiator Cooling:

Outlet controlled thermostat and housing, full open temperature 92°C (198°F)
Jacket water pump, gear driven
Single water outlet 148 mm (5.8 in, 8-10.5 mm dia. holes EQ SP, 174.6 mm bolt hole dia.
Aftercooler fresh water cooling pump (SCAC), gear driven centrifugal
SCAC pump circuit contains a thermostat to keep the aftercooler coolant from falling below 30°C (85°F)

Exhaust System

Dry, gas-tight exhaust manifolds with thermo-laminated heat shields
Dual turbochargers with thermo-laminated heat shields
Flexible exhaust fitting/weldable exhaust flange

Flywheels and Flywheel Housings

Flywheel, SAE No. 00, 183 teeth
Flywheel housing, SAE No. 00

Fuel System

Fuel filter, LH
Fuel transfer pump
Fuel priming pump, LH
Electronically controlled unit injectors
Relocated customer connection from fuel return check valve located at top of engine to fuel inlet customer connection point at base of engine. Includes rigid lines on engine as well as two flexible hoses.

Generator

See generator data, page 3

Instrumentation

Graphic Unit (Marine Power Display), LH for analog or digital display of:
Engine oil pressure
Engine water temperature
Fuel pressure
System DC voltage
Air inlet restriction
RH & LH exhaust temperature
Fuel filter differential
Oil filter differential
Service meter
Engine speed
Instantaneous fuel consumption
Total fuel consumed
Engine control switch (4-position)
Alarms are prioritized
Overspeed shutdown notification light
Emergency stop notification light
Pre-lube override
Shutdown override

Lube System

Crankcase breather, top mounted
Oil cooler
Oil filter and dipstick, LH.
Deep sump oil pan
Oil pump, gear-type
Oil pan drain valve, 2" NPT female connection

Mounting System

Rails, engine mounting, engine length, industrial floor-type
254 mm (10 in) C-channel

Protection System

ADEM A3 monitoring system provides engine deration, alarm, or shutdown strategies to protect against adverse operating conditions. Selected parameters are customer-programmable. Status available on engine-mounted instrument panel and can be broadcast through the PL1000 or I/O module. Initially set as follows:

Safety shutoff protection, electrical:

Oil pressure, water temperature, crankcase pressure, aftercooler temperature; includes air inlet shutoff, activated on overspeed or emergency stop; oil pressure and water temperature (non-redundant, uses OP and WT sensors); overspeed (redundant and independent of engine governing system)

Alarms, electrical:

ECU voltage, oil pressure, water temperature (low and high), overspeed, crankcase pressure, aftercooler temperature, low water level (sensor is optional attachment), air inlet restriction, exhaust stack temperature, filter differential pressure (oil and fuel)

Derate, electrical:

High water temperature, crankcase pressure, aftercooler temperature; air inlet restriction; altitude and exhaust temperature

Emergency stop pushbutton, located on instrument panel

Alarm switches (oil pressure and water temperature) for connection to PL1000 — unwired

Starting System

Air starting motor, RH, 620 to 1034 kPa (90 to 150 psi), LH control
Air silencer

General

Paint, Caterpillar yellow, with black rails
Vibration damper and guard
Lifting eyes

Notes

When used with competitive generator, a TVA is recommended. An alternative vibration damper may be required. The engine is wired for auto start stop.

Emergency Generator Sets Include the Following:

Engine and generator length mounting rails, 13" C-channel
Engine and generator mounting groups
DNV, ABS, or GL marine society type approved coupling
DNV requires a serial number specific certificate available through DTO
Follow ordering procedure found in LEKM5389 to order coupling certificate
Other society approvals available through DTO



ACCESSORY EQUIPMENT

Marine society and IMO Certifications (Germanischer Lloyd, China Classification Society)	Exhaust temperature thermocouples
Remote air inlet adapter	Bypass centrifugal oil filter
Battery charger	Duplex oil filter
Charging alternator	Shallow oil pan (500 hour oil change interval)
Local speed throttle control	Emergency lube oil connections
Load sharing modules	Oil level regulator
Direct rack control interface, 0-200 mA DC control	Air or electric prelube
Coolant level sensor	Sump pump
Inlet/outlet and emergency water connections	Vibration isolators
Engine-mounted plate-type heat exchanger	Auxiliary drive shafts and pulleys
Air separator	Spray shielding
Duplex fuel filter	Particle detector
Fuel level switch	Crankcase explosion relief valve
Air filter — generator	Intake manifold temperature sensors
Manual voltage control	Oil temperature sensor
Additional instrumentation:	Air or electric starting motor
Communications management device	Redundant start with select switch
Remote panel display	Jacket water heater
Remote cylinder temperature display	

RIG BASE

For use with Cat or other manufacturers' generators
Built-in three-point mounting system maintains alignment of engine and generator on uneven surfaces
Keeps substructure from flexing to prevent twist at the base and engine-generator misalignment

**DIESEL ENGINE TECHNICAL DATA****3512B Engine — 1424 bkW (1800 rpm)**

Engine speed	1800 rpm
Compression ratio	14:1
Aftercooler water temperature	60 deg C
Fuel injection system	EUI
Exhaust manifold type	Dry
Rating	Prime
Emissions certification	IMO Tier I
Fuel type	Diesel
Mean piston speed	11.4 m/s

RATING	NOTES	UNITS	100% LOAD	75% LOAD	50% LOAD
ENGINE POWER	1	kW	1418	1060	708
BMEP kPa		kPa	1827	1366	912

ENGINE DATA					
FUEL CONSUMPTION (NOMINAL)	6	L/hr	344	265	188
AIR FLOW RATE (@25°C, 101.3 kPa)	3,9	m ³ /min	118	98	74
INLET MANIFOLD PRESSURE	3	kPa	223	165	101
INLET MANIFOLD TEMPERATURE		°C	74	70	67
EXHAUST STACK TEMPERATURE	2	°C	434	416	414
EXHAUST GAS FLOW RATE (@stack temp, 101.3 kPa)	5,9	m ³ /min	298	241	181
EXHAUST GAS MASS FLOW RATE	5,9	kg/hr	8715	—	—

ENERGY BALANCE DATA					
FUEL INPUT ENERGY (LHV) (NOMINAL)		kW	3422	2637	1871
HEAT REJ. TO JACKET WATER (NOMINAL)	7	kW	562	468	368
HEAT REJ. TO ATMOSPHERE (NOMINAL)	7	kW	124	111	100
HEAT REJ. TO OIL COOLER (NOMINAL)	7	kW	171	132	94
HEAT REJ. TO EXH. (LHV to 25°C) (NOMINAL)	8	kW	1262	993	737
HEAT REJ. TO EXH. (LHV TO 177°C) (NOMINAL)	8	kW	631	485	363
HEAT REJ. TO AFTERCOOLER	7	kW	279	178	80

The corrected performance values shown for Caterpillar engines will approximate the values obtained when the observed performance data is corrected to SAE J1995, ISO3046-2 & 8665, & 2288 & 9249 & 1585, EEC 80/1269 and DIN70020 standard reference conditions

Reference atmospheric inlet air: 99 KPA (29.31 in hg) and 25°C (77°F)

Reference fuel: #2 distillate diesel with a 35° API gravity; A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 29°C (84.2°F), where the density is 838.9 G/Liter (7.001 Lbs/Gal).

GENERATOR EFFICIENCY

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

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

NOTES

- 1 Power tolerance is +/- 3%
- 2 Exhaust stack temperature tolerance is +/- 8%
- 3 Inlet airflow rate tolerance is +/- 5%
- 4 Intake manifold pressure tolerance is +/- 10%
- 5 Exhaust flow rate tolerance is +/- 6%
- 6 Fuel rate tolerance is +/- 5%
- 7 Heat rejection tolerance is +/- 5%
- 8 Exhaust heat rejection tolerance is +/- 10%
- 9 Wet exhaust mass flow rate



GENERATOR TECHNICAL DATA

Generator*

Specifications

Poles 4
 Excitation..... PMG
 Pitch..... 0.7142
 Connection SERIES STAR
 Max. Overspeed (60 sec.)..... 150% of synchronous
 Number of Bearings..... 2
 Number of Leads 6
 Wires per Lead..... 8

Ratings

Power 1360 ekW
 kVA 1700
 pf 0.8
 Voltage — L.L. 480 V
 Voltage — L.N. 277 V
 Current — L.L. 2045 A
 Frequency 60 Hz
 Speed 1800 rpm

Exciter Armature Data (at full load, 0.7 pf)

Voltage 23.78 V
 Current..... 5.15 A

Temperature and Insulation Data

Ambient Temperature..... 40°C
 Temperature Rise..... 80°C
 Insulation Class H
 Insulation Resistance (as shipped) ... 100 Megaohms
 (at 40°C)

Resistances

Stator (at 25°C)..... 0.0012 ohms
 Field (at 25°C)..... 1.12 ohms
 Short Circuit Ratio 0.58

Fault Currents

Instantaneous 3-∅ symmetrical
 fault current..... 21,487 amps
 Instantaneous L-N symmetrical
 fault current..... 29,765 amps
 Instantaneous L-L symmetrical
 fault current..... 18,949 amps

**Efficiency and Heat Dissipation
 (per NEMA and IEC at 95°C)**

Load PU	Kilowatts	Efficiency
0.25	340	91%
0.50	680	94%
0.75	1020	95.4%
1.00	1360	95.8%
1.10	1496	95.9%

Time Constants

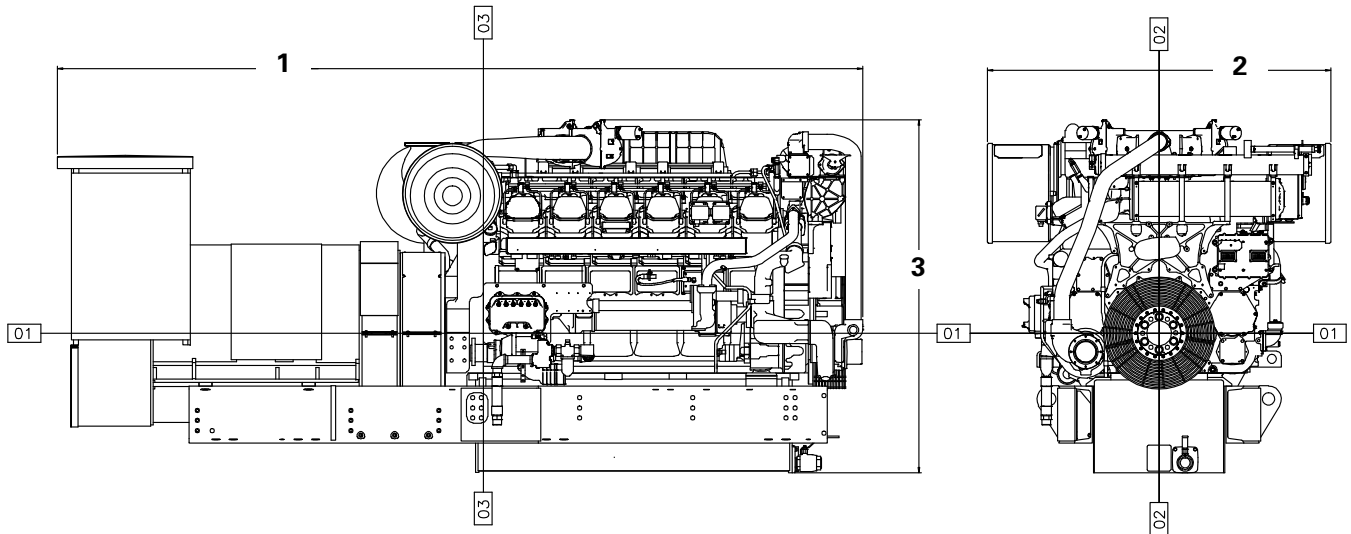
OC Transient – Direct Axis T'DO	6.929 sec.
SC Transient – Direct Axis T'D	0.4838 sec.
OC Subtransient – Direct Axis T''DO	0.0077 sec.
SC Subtransient – Direct Axis T''D	0.0067 sec.
OC Subtransient – Quadrature Axis T''QO	0.0061 sec.
SC Subtransient – Quadrature Axis T''Q	0.0054 sec.
Exciter Time Constant	0.2225 sec.
Armature SC TA	0.0506 sec.

Reactances

Reactances		Per Unit	Ohms
Subtransient — Direct Axis	X''D	0.0944	0.0128
Subtransient — Quadrature Axis	X''Q	0.0878	0.0119
Transient — Saturated	X'D	0.152	0.0206
Synchronous — Direct Axis	XD	2.1737	0.2946
Synchronous — Quadrature Axis	XQ	1.0278	0.1393
Negative Sequence	X2	0.0908	0.0123
Zero Sequence	X0	0.0192	0.0026

*Other generators are available.

DIMENSIONS



Dimensions and Weight		
(1) Length	4660 mm	183 in
(2) Width	1988 mm	78 in
(3) Height	2042 mm	80 in
Weight – dry	14 975 kg	33,014 lb

Note: Dimensions are dependent on generator and options selected. See general installation drawings for detail.

Note: Weight includes engine, generator, base, coupling, and all auxiliary components. Weight may vary depending upon individual configuration.

RATING DEFINITIONS AND CONDITIONS

Rating Definition — Prime rating with 10% overload for MCS certification. Output available with varying load for an unlimited time. Prime power in accordance with ISO8528. Typical load factor 60-70%. No limit in hours/year.

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.