**3512B Offshore Emergency Generator Set**

**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 in³)
- Aspiration: Turbocharged-Aftercooled
- Governor and Protection: Electronic ADEM™ A3

**Refill Capacity**

- Lube Oil System (refill): 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

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**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•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.
- 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.

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Actual configuration may vary from image shown
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
- Prelube 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

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

# 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

#### ENGINE DATA

<table>
<thead>
<tr>
<th>NOTE</th>
<th>UNITS</th>
<th>100% LOAD</th>
<th>75% LOAD</th>
<th>50% LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE POWER</td>
<td>kW</td>
<td>1418</td>
<td>1060</td>
<td>708</td>
</tr>
<tr>
<td>BMEP kPa</td>
<td>kPa</td>
<td>1827</td>
<td>1366</td>
<td>912</td>
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</tbody>
</table>

#### ENERGY BALANCE DATA

<table>
<thead>
<tr>
<th>NOTE</th>
<th>UNITS</th>
<th>100% LOAD</th>
<th>75% LOAD</th>
<th>50% LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FUEL INPUT ENERGY (LHV) (NOMINAL)</td>
<td>kW</td>
<td>3422</td>
<td>2637</td>
<td>1871</td>
</tr>
<tr>
<td>HEAT REJ. TO JACKET WATER (NOMINAL)</td>
<td>kW</td>
<td>562</td>
<td>468</td>
<td>368</td>
</tr>
<tr>
<td>HEAT REJ. TO ATMOSPHERE (NOMINAL)</td>
<td>kW</td>
<td>124</td>
<td>111</td>
<td>100</td>
</tr>
<tr>
<td>HEAT REJ. TO OIL COOLER (NOMINAL)</td>
<td>kW</td>
<td>171</td>
<td>132</td>
<td>94</td>
</tr>
<tr>
<td>HEAT REJ. TO EXH. (LHV to 25°C) (NOMINAL)</td>
<td>kW</td>
<td>1262</td>
<td>993</td>
<td>737</td>
</tr>
<tr>
<td>HEAT REJ. TO EXH. (LHV TO 177°C) (NOMINAL)</td>
<td>kW</td>
<td>631</td>
<td>485</td>
<td>363</td>
</tr>
<tr>
<td>HEAT REJ. TO AFTERCOOLER</td>
<td>kW</td>
<td>279</td>
<td>178</td>
<td>80</td>
</tr>
</tbody>
</table>

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 corrected BSFC 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.

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**NOTES**

1. Power tolerance is +/- 3%
2. Exhaust stack temperature tolerance is +/- 8%
3. Intake 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%
### Generator Technical Data

#### Generator Specifications

- **Poles**: 4
- **Excitation**: PMG
- **Pitch**: 0.7142
- **Connection**: SERIES STAR
- **Max. Overspeed**: 150% of synchronous
- **Number of Bearings**: 2
- **Number of Leads**: 6
- **Wires per Lead**: 8
- **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

#### Ratings

- **Temperature and Insulation Data**
  - Ambient Temperature: 40°C
  - Temperature Rise: 80°C
  - Insulation Class: H
  - Insulation Resistance (as shipped): 100 Megaohms (at 40°C)

- **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

<table>
<thead>
<tr>
<th>Load PU</th>
<th>Kilowatts</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>340</td>
<td>91%</td>
</tr>
<tr>
<td>0.50</td>
<td>680</td>
<td>94%</td>
</tr>
<tr>
<td>0.75</td>
<td>1020</td>
<td>95.4%</td>
</tr>
<tr>
<td>1.00</td>
<td>1360</td>
<td>95.8%</td>
</tr>
<tr>
<td>1.10</td>
<td>1496</td>
<td>95.9%</td>
</tr>
</tbody>
</table>

#### Resistances

- **Stator (at 25°C)**: 0.0012 ohms
- **Field (at 25°C)**: 1.12 ohms
- **Short Circuit Ratio**: 0.58

#### Reactances

<table>
<thead>
<tr>
<th>Reactances</th>
<th>Per Unit</th>
<th>Ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtransient — Direct Axis</td>
<td>X”D</td>
<td>0.0944</td>
</tr>
<tr>
<td>Subtransient — Quadrature Axis</td>
<td>X”Q</td>
<td>0.0878</td>
</tr>
<tr>
<td>Transient — Saturated</td>
<td>X'D</td>
<td>0.152</td>
</tr>
<tr>
<td>Synchronous — Direct Axis</td>
<td>XD</td>
<td>2.1737</td>
</tr>
<tr>
<td>Synchronous — Quadrature Axis</td>
<td>XQ</td>
<td>1.0278</td>
</tr>
<tr>
<td>Negative Sequence</td>
<td>X2</td>
<td>0.0908</td>
</tr>
<tr>
<td>Zero Sequence</td>
<td>X0</td>
<td>0.0192</td>
</tr>
</tbody>
</table>

*Other generators are available.*
**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.

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**DIMENSIONS**

<table>
<thead>
<tr>
<th>Dimensions and Weight</th>
<th>4660 mm</th>
<th>183 in</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Width</td>
<td>1988 mm</td>
<td>78 in</td>
</tr>
<tr>
<td>(3) Height</td>
<td>2042 mm</td>
<td>80 in</td>
</tr>
<tr>
<td>Weight – dry</td>
<td>14 975 kg</td>
<td>33,014 lb</td>
</tr>
</tbody>
</table>

**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.

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Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication.

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