### M 34 DF • Technical Data

<table>
<thead>
<tr>
<th>Engine</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>W1</th>
<th>W2</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>rpm</td>
<td>720/750</td>
<td>720/750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>kW/cyl. (MN ≥ 80)</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMEP</td>
<td>bar</td>
<td>19.9/19.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid fuel consumption</td>
<td>g/kWh @100%</td>
<td>188</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas fuel consumption</td>
<td>kJ/kWh @100%</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>%</td>
<td>44.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Without engine driven pumps. Tolerance for SFOC and efficiency +/-5%. Maximum continous rating according to ISO 3046/1.

* 2.4 g/kWh based on preliminary IMO III emission levels.

---

### M 34 DF Key Features and Key Values

- Outstanding efficiency and load-carrying capacity
- Operational simplicity – fully automated engine control
- Service and maintenance simplicity – modular engine design
- Conventional marine injection system and ignition fuel system
- MDO pilot fuel capable
- Minimal methane slip
- Operation on gas with low methane number at reduced load
- Supports HHF operation according to CIWAC HS/05 in diesel mode

**Excellent support**

- Global applications and installation support for engine and gas system periphery
- Operator and technician training
- Strong, global dealer support network with marine focus

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Dual Fuel Engine for Operation on Liquid and Gaseous Fuels

6 - 8 - 9 Cylinder

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The Power You Need.

The Cat® and Mât™ brands of Caterpillar Marine offer premier high- and medium-speed propulsion, auxiliary, and generator set solutions, as well as natural dual fuel, diesel-electric, and hybrid system configurations. With the launch of Caterpillar Propulsion, our comprehensive and evolving product line gives customers one source for the most extensive engine power range available, complex propulsion systems, controllable pitch propellers, transverse and azimuth thrusters, and controls. Cat and Mât products and technologies are proven reliable and are built to test in all marine applications, demonstrating superior productivity and the lowest lifecycle cost.

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Construction, term, or repower financing through Cat Financial helps you make Cat and Mât power a reality. With our knowledge of customer needs, local markets, and legal and regulatory requirements, we’ve been providing tailored financing solutions and exceeding expectations since our start in 1986.

For more information and to find your local dealer, please visit our website: MARINE.CAT.COM

Visit Cat Financial or: CatPowerFinance.com

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Dual Fuel Technology • M 34 DF

Caterpillar Marine designed the M 34 DF based on the reliable M 32 C engine series. It will be capable of running on multiple fuels without sacrificing the typical MaK marine engine attributes.

Driven by upcoming fuel sulfur and NOx regulations in Emission Control Areas (ECA), the M 34 DF will provide full flexibility for vessels operating in regulated and/or lesser regulated areas without major changes to the engine room or his exhaust gas system, supporting installation and certification simplicity. The M 34 DF will be capable of running as Natural Gas (NG) as an alternative to expensive lower sulfur Marine Diesel Oil (MDO) or large and complex scrubber installations for ECA operation as of 2015. The M 34 DF will share the same footprint as the very successful M 32 C engine series.

High efficiency and proven reliability make the M 34 DF an excellent propulsion engine for operation in and outside of environmental protected areas as well as vessels with WDO limitations. Due to selected operation profiles and diesel fuel costs, the M 34 DF is a preferred engine regarding low cost of operation.

Reliability Based on Proven Components
- Proven spark ignited gas engine experience since 1998
- Cylinder head in charge air duct
- Knock control

Plato
- Reduced compression ratio
- New Flexible Camshaft Technology
- Lower Valve Train
- New outlet lever
- New eccentric shaft
- New camshaft
- New intake lever
- New ignition injector
- New camshaft
- New valve unit
- Knock control

Crankcase
- Ignition fuel filter module
- Ignition fuel system
- Ignition valve unit
- Gas admission valve
- Gas valve unit
- Gas pipe leakage monitoring
- Gas lines & bellows
- Gas pressure sensor

Gas System
- Double walled gas pipes
- Ignition fuel system
- Ignition valves
- Gas admission valves
- Gas valve
- Gas detection
- Gas admission pressure sensor
- Gas admission system

Air System
- Double walled fuel pipes
- Air filter
- Filter
- Filter housing
- Gas detection
- Gas admission pressure sensor

M 34 DF • Design

M 34 DF • Safety Concept
Dual Fuel Technology • M 34 DF

Powerful, efficient, and reliable, the M 34 DF is designed to meet the needs of modern marine engines. With its dual fuel capability, it offers an attractive alternative to traditional diesel engines, providing significant environmental benefits and cost savings.

**Key Features:**
- **High Efficiency:** Optimized for dual fuel operation, the M 34 DF delivers high efficiency and reliability.
- **Environmental Compliance:** Meets stringent emissions standards, including IMO Tier III/EPA Tier 4 regulations.
- **Flexibility:** Capable of running on a variety of fuels, including natural gas and diesel, ensuring operational flexibility.
- **Reliability:** Based on proven Caterpillar components, ensuring reliability and reduced maintenance costs.
- **Low Operational Costs:** Lower fuel costs and reduced maintenance lead to lower operational costs.
- **Global Support:** Access to global Caterpillar® dealer network for support.

**Applications:**
- **Main Propulsion:** Suitable for power generation and marine propulsion.
- **Auxiliary:** Ideal for auxiliary power and propulsion applications.

**Technical Highlights:**
- **Engine Footprint:** The M 34 DF shares the same footprint as the very successful M 32 C engine series.
- **Redundancy:** Built-in fuel redundancy ensures reliable operation.
- **Emissions:** IMO III*/EPA Tier 4 emissions requirements.
- **Sulfur Content:** Emission Control Area (ECA) regulations.
- **Economic Benefits:** Reduced fuel costs, lower maintenance, and lower operational costs.

**Design Features:**
- **Gas System:** Gas admission, gas control, gas injection, and gas exhaust.
- **Crankcase:** Design enhancements for improved reliability and reduced emissions.
- **Exhaust System:** New exhaust manifold and cladding, improved heat exchanger.
- **Air System:** Dual fuel operation, ensuring efficient and reliable performance.
- **Safety Concept:** Comprehensive safety features, including explosion relief valves and ventilation systems.

**Proven Technology:**
- **Spark Ignition Gas engine:** Caterpillar is the world’s largest spark ignition gas engine manufacturer, with experience since 1998.
- **Component Reliability:** Based on proven Caterpillar® components, ensuring reliability and reduced maintenance costs.

**Conclusion:**
The M 34 DF is a versatile and reliable solution for marine propulsion, offering significant environmental benefits and cost savings. With its dual fuel capability and high efficiency, it is an attractive option for ships looking to reduce their environmental impact.
Dual Fuel Technology • M 34 DF

Caterpillar Motoren designed the M 34 DF based on the reliable M 32 C engine series. It will be capable of running on multiple fuels without sacrificing the typical MaK marine engine attributes. Driven by upcoming fuel sulfur and NOx regulations in Emission Control Areas (ECAs), the M 34 DF will provide full flexibility for vessel operation in regulated and non-regulated areas without major changes to the engine room or the exhaust gas system, supporting installation and certification simplicity. The M 34 DF will be capable of running on Natural Gas (NG) as an alternative to expensive low sulfur Marine Diesel Oil (MSO) or large and complex scrubber installations for ECA operation as of 2015. The M 34 DF will show the same footprint as the very successful M 32 C engine series.

High efficiency and proven reliability make the M 34 DF an excellent propulsion engine for operations in and outside of environmental protected areas as well as in vessels with ECO installations. Due to selected operation profiles and diesel fuel costs, the M 34 DF is a preferred engine regarding low cost of operation.

M 34 DF • Design

- Gas System
  - Double walled gas pipes and systems
  - Ignition fuel system
  - Exhaust manifold & cladding
- Air System
  - Twin turbo charger
  - Exhaust manifold & cladding
- Ignition Fuel System
  - Ignition fuel filter module
  - Wastegate/Blow off
- Controls
  - Alarm & monitoring
  - System GMS (Load Sharing)
  - System PMS
- Conduction
  - Explosion relief valves
- Safety Concept
  - Inert gas supply
  - Explosion relief valves
  - Inert gas ventilation
  - Double walled gas pipes

M 34 DF • Safety Concept

Reliability Based on Proven Components
- Proven spark ignited gas engine experience since 1988
- Cylinder is the world largest gas engine manufacturer
- Integrated LNG ship power solutions
- Global Caterpillar dealer support

Prefered Choice for Gas Electrical and Mechanical Propulsion
- Option to use additional low sulfur MSO for ECA operation
- Alternative to another installation
- Minimal impact on engine and exhaust systems downstream
- LNG infrastructure being developed
- Low operational costs

Potential future ECA

<table>
<thead>
<tr>
<th>Sulfur Content</th>
<th>Potential future years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>May 2005</td>
</tr>
<tr>
<td>2%</td>
<td>July 2010</td>
</tr>
<tr>
<td>3%</td>
<td>July 2012</td>
</tr>
<tr>
<td>4%</td>
<td>Jan. 2015</td>
</tr>
<tr>
<td>5%</td>
<td>Jan. 2020</td>
</tr>
</tbody>
</table>

0.1% Safeguards in ECA effective 2015

Caterpillar supplies a new exhaust gas emission control system (EGCS) as part of the ECA conversion package to meet IMO NOx B*2015. This package includes requirements in gas mode.

Caterpillar is the world largest gas engine manufacturer.
**M 34 DF • Technical Data**

<table>
<thead>
<tr>
<th>Engine</th>
<th>M 34 DF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engine</strong></td>
<td>12.0/14.0</td>
</tr>
<tr>
<td><strong>Bore</strong></td>
<td>340</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>460</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>720/750</td>
</tr>
<tr>
<td><strong>Power (kW/cyl. (MN ≥ 80))</strong></td>
<td>500</td>
</tr>
<tr>
<td><strong>BMEP (bar)</strong></td>
<td>19.9/19.1</td>
</tr>
<tr>
<td><strong>Liquid fuel consumption (g/kWh @100%)</strong></td>
<td>188</td>
</tr>
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<td><strong>Gas fuel consumption (kJ/kWh @100%)</strong></td>
<td>–</td>
</tr>
<tr>
<td><strong>Efficiency (%)</strong></td>
<td>44.8</td>
</tr>
</tbody>
</table>

**Technical Data**

- **Diesel Mode**
  - Emission: IMO II
  - Bore: 340 mm
  - Stroke: 460 mm
  - Speed: 720/750 rpm
  - Power: 500 kW/cyl.
  - BMEP: 19.9/19.1 bar
  - Liquid fuel consumption: 188 g/kWh
  - Gas fuel consumption: –
  - Efficiency: 44.8%

- **Gas Mode**
  - Emission: IMO III*
  - Bore: 340 mm
  - Stroke: 460 mm
  - Speed: 720/750 rpm
  - Power: 500 kW/cyl.
  - BMEP: 19.9/19.1 bar
  - Liquid fuel consumption: 188 g/kWh
  - Gas fuel consumption: –
  - Efficiency: 44.8%

---

**M 34 DF Key Features and Key Values**

- Outstanding efficiency and load capacity
- Operational simplicity
- Service and maintenance simplicity
- Modular engine design
- Conventional marine injection system and ignition fuel system
- MDO pilot fuel capable
- Minimal methane slip
- Operates on natural gas with low methane number at reduced load
- Supports HFO operation according to CIMAC H55/K55 in diesel mode

---

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For more information and to find your local dealer, please visit our website: MARINE.CAT.COM

Visit Cat Financial at: CatPowerFinance.com
### Diesel Mode | Gas Mode
---|---
**Emission** | **IMO II** | **IMO III**<sup>2</sup>
**Bore** | 340 | 340
**Stroke** | 460 | 460
**Speed** | 720/750 | 720/750
**Power** | 500 kW | 500 kW
| 650 (at 1800 rpm) | 650 | 650
**BMEP** | 19.9/19.1 bar | 19.9/19.1 bar
**Liquid fuel consumption** | 188 g/kWh @100% | 7,708 kJ/kWh @100%
**Gas fuel consumption** | – | –
**Efficiency** | > 48.8% | > 52.0%

<sup>1</sup>Without engine driven pumps. Tolerance for SFOC and efficiency +/-5%.<br><sup>2</sup>2.4 g/kWh based on preliminary IMO III emission levels

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