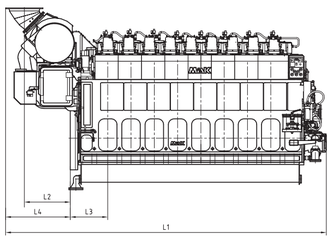
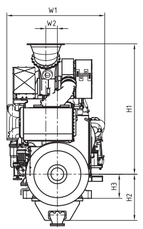
M 34 DF • Technical Data

		Diesel Mode	Gas Mode
Emission		IMO II	IMO III*
Bore	mm	340	340
Stroke	mm	460	460
Speed	rpm	720/750	720/750
Power	kW/cyl. (MN≥80)	500	500
BMEP	bar	19.9/19.1	19.9/19.1
Liquid fuel consumption	g/kWh @100%	188	1.8
Gas fuel consumption	kJ/kWh @100%	–	7,708
Efficiency (development target)	%	~ 44.8	> 46.7

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





Propulsion Engine Dimensions (mm) and Weights (t)										
Engine	L1	L2	L3	L4	H1	H2	H3	W1	W2	t
6 M 34 DF	5934	788	852	1168	2784	1052	550	2418	962	39.5
8 M 34 DF	7298	1044	852	1472	2969	1052	550	2229	262	49.0
9 M 34 DF	7828	1044	852	1472	2969	1052	550	2229	262	52.0

All mentioned data is preliminary!

M 34 DF Key Features and Key Values

- Outstanding efficiency and loading 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 natural gas with low methane number at reduced load
- Supports HFO operation according to CIMAC H55/K55 in diesel mode

Excellent support

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

Caterpillar Marine Power Systems

Headquarters

Caterpillar Marine Power Systems A Division of Caterpillar Motoren GmbH & Co.KG
Neumühlen 9
22763 Hamburg/Germany

Phone: +49 40 2380 3000
Telefax: +49 40 2380 3535

Europe, Africa, Middle East

Caterpillar Marine Power Systems A Division of Caterpillar Motoren GmbH & Co.KG
Neumühlen 9
22763 Hamburg/Germany

Phone: +49 40 2380 3000
Telefax: +49 40 2380 3535

Americas

MaK Americas Inc.

3450 Executive Way
Miramar Park of Commerce
Miramar, FL. 33025/USA

Phone: +1 954 885 3200
Telefax: +1 954 885 3131

Asia Pacific

Caterpillar Marine Trading (Shanghai) Co., Ltd.

25/F, Caterpillar Marine Center
1319, Yan'an West Road
200050 Shanghai/P. R. China

Phone: +86 21 6226 2200
Telefax: +86 21 6226 4500

Caterpillar Marine Asia Pacific Pte Ltd

No. 5 Tukang Innovation Grove
Singapore 618304
Republic of Singapore

Phone: +65 68287 600
Telefax: +65 68287 625

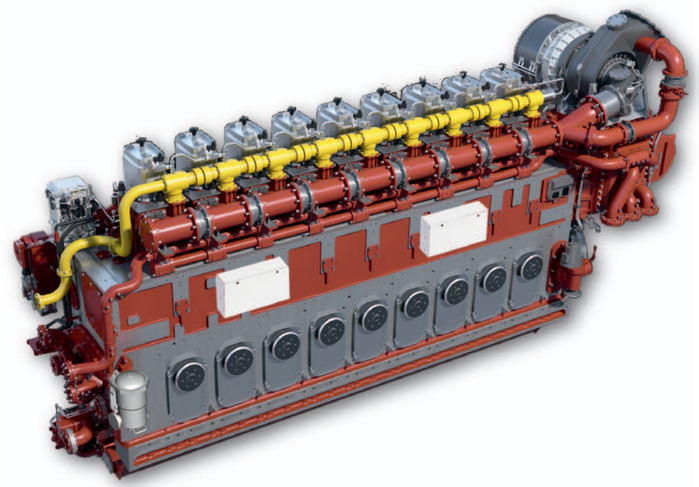
For more information please visit our website:
MARINE.CAT.COM

Subject to change without notice.
Leaflet No. 259 · 07.13 · e · L+S · VM3

MaK

M 34 DF

Dual Fuel Engine
for Operation on Liquid and Gaseous Fuels
6 • 8 • 9 Cylinder



MaK

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 operating on multiple fuels without sacrificing the typical MaK marine engine attributes.

Driven by upcoming fuel sulfur and NO_x 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 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 (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 waters with HFO limitations. Due to selected operation profiles and diesel fuel costs, the M 34 DF is a preferred engine regarding low cost of operation.

Preferred Choice for Gas Electrical and Mechanical Propulsion

- Option to avoid expensive low sulfur MDO for ECA operation
- Alternative to srubber installation
- Minimal impact on engine and exhaust systems dimensions
- LNG infrastructure being developed
- Low operational costs

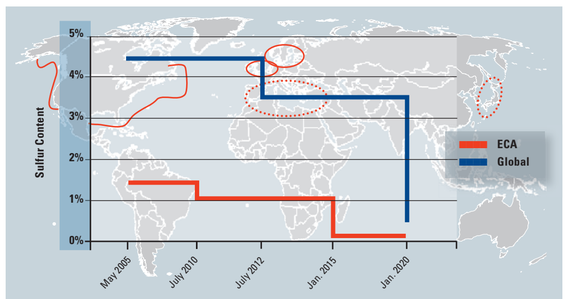
- Expectations of decreasing LNG prices worldwide
- Reduced particle emissions
- Supports CO_2 reduction initiatives:
  - Energy Efficiency Design Index (EEDI)
  - Local incentive programs
- Built-in fuel redundancy

Reliability Based on Proven Components

- Proven spark ignited gas engine experience since 1998
- Caterpillar is the world largest gas engine manufacturer
- Integrated LNG ship power solutions
- Global Caterpillar® dealer support

0.1% Sulphur limits in ECA effective 2015.

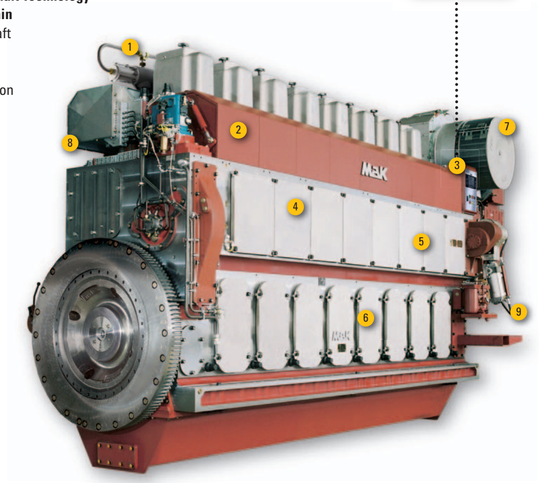
EPA: M 34 DF is designed to meet future IMO III*/EPA Tier 4 emissions requirements in gas mode.



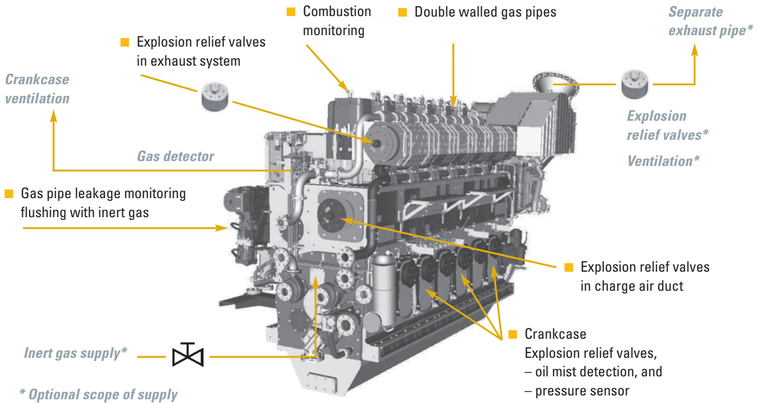
Emission Control Area (ECA)
Potential future ECA

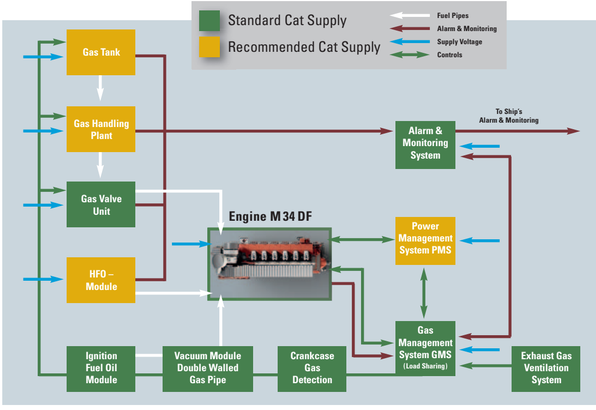
M 34 DF • Design

1. **Gas System**
   - Double walled gas lines & bellows
   - Leakage monitoring
   - Gas valve unit
2. **Ignition Injector**
   - Gas admission valve
   - Cylinder pressure sensor
3. **Modular Alarm and Control System MACS**
   - Gas mode
   - Diesel mode
   - Switchover
   - Knock control
4. **Piston**
   - Reduced compression ratio
5. **New Flexible Camshaft Technology and Lower Valve Train**
   - New eccentric shaft
   - New outlet lever
   - New camshaft
   - Diesel/gas operation
6. **Crankcase**
   - Explosion valves
   - Bearing temperature monitoring
   - Gas detection
   - Pressure monitoring
7. **Air System**
   - New turbocharger
   - Wastegate/Blow off
8. **Exhaust Manifold & Cladding**
   - Explosion relief valves
9. **Ignition Fuel System**
   - Ignition fuel filter module
   - High pressure pump
   - Double walled fuel pipes

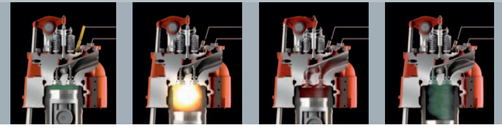


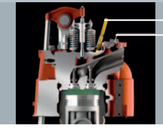
M 34 DF • Safety Concept





Dual Fuel • Main Propulsion • 6, 8, 9 Cylinder





Liquid Fuel
Gas Fuel