Operational simplicity and engine characteristics:

- Key attributes of the M4 6 DF are class leading efficiency and loading capacity as well as the operational simplicity which is supported by a fully automated engine control.
- Fast service access as well as service and maintenance simplicity are supported by a modular engine concept and the monitoring and diagnostic system.
- Operation on natural gas with min. methane number 55 possible 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 product support network with Marine focus.

Conversion of M 43 C to M 46 DF engines are supported by similar dimensions and system interfaces.

All mentioned data are preliminary!
The Dual Fuel Engine Concept

Based on the successful M 43 C MaK medium speed engine, Caterpillar Mo-
toren, has designed the M 46 DF to meet and exceed the M 43 C reliability and life-
time expectations, while maintaining its class leading position regarding opera-
tional efficiency and reliability.

Applying the same design philosophies, the M 46 DF will show the same footprint with the M 43 C providing the opportunity to retro-fit M 43 C engines.

While it’s clear design the M 46 DF does allow fast and easy access to system and components, supporting the operation, service and maintenance simplicity MaK products are known for.

 Designed to operate on gas/oil as well as liquid (MDO/HFO) the M 46 DF will meet IMO II emission limits while operating in gas mode, injecting a small amount of ignition fuel to control ignition.

The M 46 DF will comply with IMO II emission regulations while operating in diesel mode. (liquid fuels only)

The M 46 DF will be certified to meet IMO II emission limits while operating in gas mode, injecting a small amount of ignition fuel to control ignition.

Engine loads and gas qualities.

Flexible Camshaft Technology (FCT) and lower valve train

- New eccentric profile.
- Actuation linkage.
- Torselocker.
- Optimised for gas mode operation and superior engine efficiency in gas- and diesel operation modes.
- Blow off valve and waste gate actuation for optimised air fuel ratio control.

Micro pilot fuel injection system

- Gear driven high pressure fuel pump and filter system with easy service access.
- Reliability combined with service and maintenance simplicity, through individual ignition fuel injector and “in-cylinder head” integrated ignition fuel return pipes.

Cylinder Head

- Ignition fuel injector and integrated gas admission valve with easy service and maintenance access.
- Cylinder pressure sensors for highest operational-reliability and engine monitoring, replacing contactless knocking sensor technology.

Exhaust Manifold & Cladding

- Exploded relief valves integrated.
- Piston, Piston Rings and Liner
- Designed for operation on gas and diesel.
- Bore increase.

Connecting Rod

- Redesigned compression ratio.
- Marine head connecting rod for shortened piston stroke.

Engine Block

- M 43 C footprint and interface.
- Counterbore for easy gas mode operation.
- Counterbore
- No dimensional change.
- Advanced crankshaft material.

Control & Monitoring Systems

- Control system for gas- and diesel mode operation.
- Multi-line pressure monitoring for optimised cylinder balancing and higher efficiency.
- Communication and interaction with engine system peripherals through data bus systems.
- Auto change from gas- to diesel mode operation and vice versa without power interruption.
- Remote monitoring and service diagnostics.

MaK Dual Fuel Engines

Building on its marine engine legacy Caterpillar Motoren designed the M 46 DF for a variety of marine applications without sacrificing the typical MaK marine engine attributes like operational reliability and efficiency and efficiency as well as serviceability.

Designed to meet the stringent conditions of upcoming emission- and fuel sulfur regulation the M 46 DF will provide maximum flexibility for coastal operating in regulated and/or lesser regulated areas without significant changes to engine room or the exhaust gas system, maintaining installation and certification simplicity at the same time.

The low emission footprint paired with high efficiency and reliability make the M 46 DF an ideal propulsion engine for a variety of marine applications with- out the need for a separate gas engine room.

Operational Cost (%)

- Operational cost reduces as the % sulphur content in fuel increases.
- Depending on an engine’s selection the M 46 DF can be used for a variety of marine applications without the need for a separate gas engine room.

Fuel Flexibility and High Efficiency: A new Generation of Engines built by Caterpillar Motoren!

Fuel System

- Optimised for gas mode operation.
- Reliability combined with service and maintenance simplicity, through individual ignition fuel injector and “in-cylinder head” integrated ignition fuel return pipes.

Gas System

- Double walled gas piping to support an inherently safe engine room.
- Leak detection.
- Segmented gas detection system as request.

Flexible Cannibal Technology (FCT) and lower valve train

- New eccentric profile.
- Actuation linkage.

Engine Block

- M 43 C footprint and interface.
- Counterbore for easy gas mode operation.
- Counterbore
- No dimensional change.
- Advanced crankshaft material.

Designed for Reliable Operation

- The operator-friendly service and maintenance care is supported by the modular engine design.
- Short time expectations, while maintaining it’s modular protected areas as well as waters in gas and diesel mode.

- Optional Cat Supply
- Standard Cat Supply
- Optional Cat Supply
- Standard Cat Supply

- Into the lubricating oil system.
- Intake air cooling, exhaust air cooling, exhaust valves and exhaust valve control on a variety of different diesel- and gas qualities.

- Into the lubricating oil system.
- Intake air cooling, exhaust air cooling, exhaust valves and exhaust valve control