MAN B&W ME-B Engines
Stronger, shorter, lighter
The MAN B&W ME-B engine series offers optimal engine performance in powerful, economic, weight-saving and future-oriented diesel engines, ensuring that the MAN Diesel & Turbo design will remain market leader for decades to come.

The shipping market is dynamic and constantly requires more competitive propeller systems and engines, allowing the lowest possible propeller speeds, lower fuel and lube oil consumption. At the same time, more flexibility in regard to emissions and adjustment of engine parameters is required, which calls for an evaluation of design parameters, engine controls and layout.

In tune with the market acceptance of electronically controlled engines turning into a market demand, MAN Diesel & Turbo introduced the engine series, designated ME-B.

MAN Diesel & Turbo is using the ME-B series to broaden the application of the ME concept in its two-stroke engines, using the electronic, fuel injection control already introduced in its large bore, ME-C engines.

The ME-B design is based on that of the existing, mechanical MC-C range – the market’s most popular two-stroke diesel engines ever – but represents an upgrade with electronic controls that provide improved operational economy and flexibility, and manoeuvrability.

The ME-B series is the optimal solution of a concerted evaluation of cost, emissions and oil consumption. MAN Diesel & Turbo introduced the ME-B series in mid-2006 with the S35ME-B9, S40ME-B9 and S50ME-B9, and later followed by the S46ME-B8. Subsequently, the series has been expanded with the launch of the new MAN B&W S30ME-B9 and the ultra-long-stroke G50ME-B9 engines, with the result that the entire ME-B programme now comprises a total output range from 3,200 kW to 15,480 kW.
Based on well-proven diesel technology, the ME-B series provides engines geared to market requirements for:

- Electronic fuel injection control
- Fuel economy
- High power reliability
- Longer time between overhauls
- Low propeller speed
- Better vessel manoeuvrability
- Very low life cycle costs
- Tier II emissions compliance.
8S35ME-B9 Engine

Engine components

1 Twin fuel oil pressure booster
2 Turbocharger
3 Alpha Lubricator
4 Light camshaft
5 Cylinder liner
6 Connecting rod
7 Turning gear
8 Exhaust valve
9 Exhaust valve actuator
10 Crosshead
11 Piston rod
12 Piston
13 Cylinder frame
Emissions

Meeting IMO Tier II and III

Tier II

The ME-B design is based on MAN Diesel & Turbo’s existing engine ranges, which are among the most popular engines available in today’s low-speed market. The ME-B design represents an upgrade with electronic controls that provide improved operational economy, flexibility and manoeuvrability. An electronically-controlled fuel-injection system equips the ME-B range to meet Tier II emission requirements, while the Alpha Lubricator also comes as standard with all ME-B engines, ensuring a very low, cylinder-lubricating-oil consumption. The ME-B’s advanced, electronic, user-friendly interface allows precise adjustment and helps secure longer times between overhauls.

The next step – Tier III

Compliance with IMO Tier III regulations basically requires an 80% reduction in NOx emissions – compared to Tier I – within the designated emission control areas (ECAs) over a defined test cycle. Such a reduction cannot be achieved by internal engine optimisations alone but, rather, requires secondary measures.

MAN Diesel & Turbo offers two main such measures to meet Tier III: selective catalytic reduction (SCR) and exhaust gas recirculation (EGR). Both methods enable compliance with these stringent regulations and provide the flexibility to choose the solution that suits individual requirements best, for example, distances travelled within ECA zones as a percentage of total ship usage, different ownership models or different engine-operation profiles.

Additionally, our G-type programme, with its ultra-long stroke, reduces engine speeds according to the ‘slow steaming’ concept, thereby paving the way for ship designs with unprecedented high-efficiency, reducing fuel consumption and emissions.

Engine Programme

MAN B&W ME-B engine

Tier II, MAN B&W ME-B engines – principal data (L1)

<table>
<thead>
<tr>
<th>Cyl. No.</th>
<th>ME-B9</th>
<th>S50ME-B9</th>
<th>S46ME-B8</th>
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<tbody>
<tr>
<td>Bore (mm)</td>
<td>500</td>
<td>500</td>
<td>460</td>
</tr>
<tr>
<td>Stroke (mm)</td>
<td>2,214</td>
<td>2,214</td>
<td>1,932</td>
</tr>
<tr>
<td>MEP (bar)</td>
<td>21</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Engine Speed (r/min)</td>
<td>117</td>
<td>117</td>
<td>120</td>
</tr>
<tr>
<td>Mean Piston Speed (m/s)</td>
<td>8.6</td>
<td>8.6</td>
<td>8.3</td>
</tr>
<tr>
<td>Power (kW)</td>
<td>8,600-15,480</td>
<td>8,900-16,020</td>
<td>6,900-11,040</td>
</tr>
<tr>
<td>SFOC (g/kWh)</td>
<td>167</td>
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Tier III, MAN B&W ME-B engines – principal data (L1)

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Typical engine power vs. propeller speed for single screw ships
Engine Data
MAN B&W ME-B engines

ME-B9
The Mark 9 series of engines have a stroke-bore ratio of 4.4:1 to facilitate a low propeller speed. This results in minimum speed values ranging from 148 rpm for the S30ME-B and down to 89 rpm for the S50ME-B. The engines have all been introduced with a mean effective pressure of 21 bar.

ME-B fuel injection control system
The advanced fuel injection control is an efficient way of managing current and future environmental emission requirements, while maintaining an outstanding fuel economy down to 162 g/kWh. The Alpha Lubricator comes as standard, ensuring a very low cylinder lubricating oil consumption whose electronic, user-friendly interface allows precise adjustment.

Fuel injection is performed by one fuel booster per cylinder, similar to the present ME engine. The exhaust gas valve is equipped with a special exhaust actuator with a timing piston, and a control valve enables control of the closing time of the exhaust valve. Two electrically driven pumps provide the hydraulic power for the injection system. In case of failure of one pump, more than 50% engine power will be available, enabling around 80% ship speed.

The ME-B system has the same possibility for rate-shaping as the existing ME engines and grants you the freedom to choose the injection profile to minimise SFOC, while keeping emissions within given limits.

Bedplate, frame box and cylinder frame
The structural parts have been strengthened to accommodate the higher engine output with the bedplate using a well-proven, welded design. The engines’ cast parts are made from rolled steel plates, ensuring homogeneity and reducing the risk of casting imperfections.

Similarly, the frame box uses the tried and tested triangular, guide-plane design with twin staybolts giving excellent support to the guide shoe forces, while the cylinder frames are manufactured from nodular cast iron or welded design due to its high strength and high E-modulus that counteracts the high ignition forces. When compared with grey cast iron, the weight of, for example, a S6S35ME-B cylinder frame, can be reduced by 3 tonnes.

FEM-calculations show that all deformations and stresses are lower or equal to that of MAN Diesel & Turbo’s existing engine range, meaning the engine structure is as reliable as the existing engines, which have performed excellently.

Crankshaft
Even though the stroke/bore ratio has been increased for the Mark 9 engines, the cylinder distance has been only slightly increased. Comprehensive FEM calculations ensure that the crankshaft geometry is optimised to hold rigidity, shrink-fit and stress values on a level with MAN B&W MC-C engines.

Combustion chamber
This has been designed to accommodate the higher ignition pressure and thermal load, while simultaneously increasing the TBOs.

Cylinder liner
The ME-B series uses a slim cylinder liner, as used on MAN Diesel & Turbo’s other MC-C/ME engines, but the material has been upgraded to counteract the higher firing pressure. A piston cleaning ring has also been introduced to prevent bore polish.

Piston
The piston is bore-cooled while the piston crown shape has been carefully designed to cope with the engines’ increased power. All piston ring running surfaces are alu-coated for safe running-in.

Thrust bearing
Due to the higher engine power, a flexible thrust cam has been introduced to obtain a more even load distribution on the pads. The smaller dimension of the parts allows for a more compact installation.

Turbocharger
ME-B engines can also be delivered with TCA turbochargers with variable nozzle ring technology (VTA) which facilitates the control of the scavenge air pressure, thereby reducing fuel consumption at part load.

Summary
The ME-B series offers optimal engine performance in powerful, economic, weight-saving and future-oriented diesel engines, ensuring that they will remain market leaders for decades to come. Based on well-proven diesel technology, the ME-B series provides engines geared to market requirements for:

- Electronic fuel injection control
- Fuel economy
- Higher power reliability
- Longer time between overhauls
- Lower propeller speed
- Better manoeuvrability
- Very low life cycle costs.