MAN 48/60
Four-stroke diesel engine
MAN Diesel & Turbo
Powering the world – responsibly

MAN Diesel & Turbo is the world’s leading provider of large-bore diesel engines and turbomachinery. Our product portfolio includes two-stroke and four-stroke engines for marine and stationary applications, turbochargers and propellers, as well as gas and steam turbines, compressors and chemical reactors.

MAN solutions can be found in ship propulsion, engine-based power plants and turbomachinery trains for the oil & gas and process industries. We support our global customers with a comprehensive range of after-sales services under the MAN PrimeServ brand.

MAN Diesel & Turbo has always been committed to increasing fuel efficiency and reducing emissions. Today, this commitment ensures that our customers are able to meet increasingly strict emissions regulations and plays a vital role in reducing the environmental impact of global trade and industry.
Our Best-Selling Engine
MAN 48/60

Both economical and environmentally friendly, the MAN 48/60 is a prime mover in the truest sense. With a power output range of 12,600 to 18,900 kW, this reliable, high-output engine is the four-stroke heart of medium and large diesel power plants the world over.

Reliable power output
The MAN 48/60 engine is capable of continuous operation on heavy fuel oil even for fuel qualities with a viscosity up to 700 mm²/s (cSt) at 50°C.

Heavy fuel operation is permissible for certain periods even at low load.

For engines driving a generator, in accordance with DIN ISO 8528-1, a 10% overload is allowed for a brief period for governing purpose (e. g. suddenly applied load) to prevent frequency drop.

Rugged engine block
The engine is housed in a rigid monobloc frame, further strengthened by continuous tie rods. These run from the underslung main bearing to the top edge of the engine frame, and from the cylinder head through the intermediate plate.

Cylinder liner with fire ring
The thick-walled design provides high resistance to deformation, preventing cavitation. This leads to better piston performance and a longer service life. Cooling at the top of the liner ensures uniform temperature distribution over the entire surface.
A Top Performer
Powerful and reliable

Stepped piston
The forged dimensionally stable steel crown (with shaker cooling) is made from high-grade materials, while the skirt is constructed from spheroidal graphite cast iron (skirt also available in steel upon request), to provide superior durability.

Both the stepped piston and fire ring prevent combustion residue accumulating on the piston crown and cylinder liner. In combination with chromium ceramic coating of the first piston ring and chromium coating of the second and third piston rings, this minimises wear of the cylinder liner and reduces lubricating oil consumption.

Cylinder head and durable valves
Designed for safe, high ignition pressures, the cylinder head is equipped with effective bore cooling. All valves are armoured to reduce wear, and the exhaust valve seats are water-cooled. The exhaust valves have an exhaust-driven rotor, while the inlet valves are rotated using rotocaps, keeping the valve seat clean.

Sophisticated fuel injection
High-pressure injection with improved atomisation ensures good combustion with any fuel quality. The injection system has been designed for lower fuel consumption and lower emissions.

Connecting rod and bearing
The marine head design, with a joint in the upper shaft, allows piston overhaul without removal of the connecting rod bearing. A low piston height also makes overhaul easier. Optimised bearing shells in the connecting rod increase reliability.

Improved design
To make the MAN 48/60 even better, the design has been enhanced. Improvements include better combustion chamber geometry, a higher density ratio, and more accurate injection and valve timing. All of these features reduce fuel consumption and improve ignition, even with poor fuel qualities.
Top turbochargers

The constant pressure turbocharging system uses state-of-the-art MAN Diesel & Turbo TCA series turbochargers, with long-bearing overhaul intervals. Their high efficiency at full and part loads ensures thorough combustion with low thermal stress and no residue.

MAN 48/60 V-engines are charged by a single TCA turbocharger, with the advantage that the cylinders share a single exhaust line. A new turbocharger module with integrated intercoolers significantly reduces the engine centres between two adjacent V-engines.

Service-friendly design

A number of features make servicing the MAN 48/60 easy:
- Hydraulic tools for tightening and loosening cylinder head nuts, and for the crankshaft and big-end bearings;
- Clamps with quick-release fasteners and/or clamp and plug connectors;
- Generously sized access covers;
- A practically maintenance-free sleeve spring vibration damper.

SaCoSone for enhanced safety

The MAN 48/60 is equipped with the latest generation of the proven MAN Diesel & Turbo engine management system, SaCoSone. This system is tested at the factory together with the engine, making fine tuning and functional testing easier and smoother when the power unit is commissioned.

Low exhaust emissions

As with all MAN Diesel & Turbo engines, MAN 48/60 engines comply with World Bank guidelines for exhaust emissions. Even lower NOx emissions can be achieved to fulfil worldwide emission standards for specific plants.

For example, engines can be equipped with MAN’s advanced selective catalytic reduction (SCR) technology.

The more thorough the combustion, the lower the particle emissions. MAN Diesel & Turbo’s highly efficient engines produce particle emission rates well below the World Bank guidelines, provided that fuel with low ash content is used.
Technical Data
Definitions

Engine cycle: four-stroke
Turbocharging system: constant-pressure

Number of cylinders
V-engine: 12, 18
Bore: 480 mm
Stroke: 600 mm
Swept volume per cyl.: 108.6 dm³

Cylinder output (MCR)
at 514 rpm: 1,050 kW
at 500 rpm: 1,050 kW

Cooling
Cylinder cooling: cooling water
Charge-air cooler (two-stage): fresh water
Fuel injector cooling: fresh water

Starting method
Compressed air

Emissions
The engines comply with the World Bank guidelines for thermal power plants.

General definition of diesel engine ratings according to ISO 30461/1-2002

Ambient conditions according to ISO 3046-1:2002

The stated consumption figures refer to the following reference conditions according to ISO 3046-1:

- Ambient air pressure: 1,000 mbar
- Ambient air temperature: 25°C (77°F)
- Charge air temperature: According to engine type, corresponding to 25°C cooling water temperature before charge air cooler.

Figures are given with a tolerance of 5%, except for the lubricating oil consumption, which is given with a tolerance of 20%.
## Technical Data

### Output, dimensions and weight

<table>
<thead>
<tr>
<th>Number of cylinders</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>W (mm)</th>
<th>H (mm)</th>
<th>Genset dry mass (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td>9,835</td>
<td>4,950</td>
<td>14,785</td>
<td>4,700</td>
<td>6,250</td>
<td>273</td>
</tr>
<tr>
<td>18V</td>
<td>13,148</td>
<td>5,410</td>
<td>18,558</td>
<td>4,700</td>
<td>6,530</td>
<td>375</td>
</tr>
</tbody>
</table>

The dimensions and weights are given for guidance only.
MAN 48/60

<table>
<thead>
<tr>
<th>Bore 480 mm, stroke 600 mm</th>
<th>12V</th>
<th>18V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine speed</td>
<td>rpm</td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>Hz</td>
<td></td>
</tr>
<tr>
<td>Electrical Genset power</td>
<td>kWₑ</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>12V</th>
<th>18V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine speed</td>
<td>500/514</td>
<td>500/514</td>
</tr>
<tr>
<td>Frequency</td>
<td>50/60</td>
<td>50/60</td>
</tr>
<tr>
<td>Electrical Genset power</td>
<td>12,411</td>
<td>18,654</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electr. Genset heat rate at 100% load</th>
<th>12V</th>
<th>18V</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Bank 1998</td>
<td>7,543</td>
<td>7,528</td>
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<tr>
<td>World Bank 2007 / 2008</td>
<td>7,630</td>
<td>7,614</td>
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</tbody>
</table>

Nominal generator efficiency 12V-type: 98.5%; 18V-type: 98.7%; without pumps; 5% tolerance

<table>
<thead>
<tr>
<th>Lube oil consumption</th>
<th>12V</th>
<th>18V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6.3</td>
<td>9.5</td>
</tr>
</tbody>
</table>

20% tolerance
World-Class Service
Marine propulsion, gensets, and stationary plants

The PrimeServ offering

The MAN Diesel & Turbo Group offers worldwide, round-the-clock service, 365 days a year. In addition to MAN Diesel & Turbo’s service headquarters in Augsburg, Copenhagen, Frederikshavn, Saint-Nazaire, Hamburg and Stockport, service centers on all continents provide comprehensive and continuous support.

MAN Diesel & Turbo engines are renowned for their quality and durability. We are a global organization with a strong local presence, delivering exceptional field service management, tailor-made solutions, and first-class technical support.

PrimeServ provides advice and assistance to customers throughout the product life cycle, from delivery to resale. With our far-reaching network of service centers, we respond rapidly to customer needs. Furthermore, we offer outstanding service and unrivalled technical expertise. Plus, we only use genuine spare parts – safeguarding the longevity of your engine.

PrimeServ’s aim is to provide:

- Prompt delivery of high-demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored O&M contracts
- Ongoing training and qualification of operators and maintenance staff
- Global service, 24 hours a day, 365 days a year
- Diagnosis and troubleshooting with our high-performance Online Service
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