MAN Dual-Fuel GenSets
L23/30DF and L28/32DF
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Flexible dual-fuel power technology is becoming increasingly important in a marine market where oil prices are fluctuating and emission legislation is becoming ever more stringent. As shipping route and operation vary, every ship has different requirements in terms of dual-fuel design and time frame for installation. This demands careful planning and consideration of the liquefied natural gas (LNG) systems available in order to find the most beneficial solution for your particular needs.

An alternative to dual-fuel engines is pure gas engines, but dual-fuel engines have several advantages over pure gas engines. Most importantly, if gas operation is interrupted, or a shortage of gas occurs, the system switches seamlessly to fuel operation.

MAN Diesel & Turbo has developed a reliable and cost-effective concept for MAN dual-fuel GenSets providing the flexibility and freedom to install now or be prepared for dual-fuel running. The dual-fuel GenSets running on gas can be delivered as new-building, ready for dual-fuel operation as most dual-fuel components can be pre-installed on the engine and the remaining delivered with the engine for later installation or as a retro-fit solution. The control and safety system and sensors necessary for gas operation are installed and prepared for gas operation.

The dual-fuel GenSets running on gas possess inherent advantages in terms of reducing emissions and offer full fuel flexibility and high efficiency regardless of price fluctuations in the fuel market. MAN dual-fuel GenSets also offer low operational and maintenance costs.
Advantages of L23/30DF and L28/32DF

MAN Diesel & Turbo’s dual-fuel generating sets form part of a complete marine solution with the low-speed MAN B&W ME-GI main engines. MAN L23/30DF and MAN L28/32DF are designed to complement the two-stroke dual-fuel ME-GI engine as part of a complete power package.

The inherent advantages of the dual-fuel design are:

- a high reliability, since the dual-fuel genset is based on the most sold marine engine type ever with more than 16,000 engines in service worldwide
- a competitive first-cost price is achieved by using the same fuel injection system in gas mode and fuel mode
- spare parts with high availability
- simple and easy operation
- long time between overhaul (TBO)
- low maintenance cost
- retrofit packages available
- available as Dual-Fuel Ready concept.
Dual-Fuel Operation

L23/30DF and L28/32DF are based on the proven classic GenSet designs L28/32H and L23/30H, recognised worldwide as ultra-reliable and robust GenSets with long TBOs.

MAN dual-fuel GenSets are already the relied power source on board ships from international shipowners. The reliability of the dual-fuel GenSets has been established as several thousand running hours in gas operation are long since passed. Especially on container vessels L28/32DF has proven its reliability.

Fig. 1 shows a dual-fuel engine overview where the main gas components are highlighted. A flexible engine room layout is possible due to the properties of the gas valve regulator. The regulator ensures a constant gas pressure at the gas valve injectors, see Fig. 2.

Fig. 1: Engine overview showing: 1. Gas control valve, 2. Gas block and 3. Double-walled gas pipe with leak detection

Fig. 2: The gas valve regulator is shown mounted on the engine
A competitive first-cost is achieved through the unique fuel injection system, see fig. 3.

In fuel mode, the oil (MGO) is injected through the main oil valve and the same valve is used for injection of pilot oil (MGO) when the GenSets are running in gas mode. This means that a separate fuel oil injection system with injectors, pumps and pipes for running in gas mode is not required. Further, the injection design enables a cost-effective and easy retrofit as no additional pilot oil system is needed.

Fig. 3: Gas components on the dual-fuel engine: 1. Gas injection valve, 2. Gas block, 3. Double-walled gas pipe with gas leak detection and 4. Gas pipe/gas connection
Flexible Installation

An LNG supply system is shown in Fig. 4, where the GenSets can combust boil-off gas.

The gas valve regulator mounted on the MAN dual-fuel GenSets ensures a constant gas pressure at the engine and allows a flexible installation of the gas valve units (GVUs), see Fig. 4.

If limited space is available in the engine room this is an advantage as it can be designed in various ways. The GVUs can be placed either separately or in a designated GVU room up to 100 m from the GenSets.

Fig. 4: An LNG supply system for dual-fuelled GenSets
Easy Installation of the Engine Series L23/30 – Plug and Play

The new monocoque design is a cost-down initiative that simplifies the installation of the engine series L23/30 including the new L23/30DF. The improved base frame concept offers several technical advantages, a reduction of the overall weight of the GenSet and a stiffer construction that reduces the level of vibration.

The key economic benefits of the redesigned base frame are reduced engineering and installation costs. The new design has made the traditional welded steel foundation with support towers and subsequent levelling superfluous. The installation of the GenSet now only requires three mounting points for the 3-conical support, see Fig. 5.

Fig. 5: Installation of the GenSet only requires three mounting points
**MAN Diesel & Turbo Online Service**

**Greater protection for your engines**
In the modern global economy, the rapid transmission of information for engine evaluation plays a decisive role, particularly in the field of transportation and power generation. Thanks to the internet, MAN Diesel & Turbo can receive/transmit important engine and installation information from/to anywhere in the world, making the know-how of experts available in real time.

MAN Diesel & Turbo’s dedicated engine-diagnostics system – CoCoS-EDS – offers owners and operators an integrated system for data analysis. It helps system users with fault finding, in the process minimising damage and failures.

In the event of a fault, and at the customer’s request, CoCoS-EDS enables the transmission of all fault-relevant data to our MAN specialists for analysis. In many cases, problems can be solved directly on-site by the crew with the help of Online Service troubleshooting. This method facilitates a swift response and frequently saves the expenses for an on-site diagnosis performed by travelling engineers.

CoCoS-EDS diagnostic capabilities derive from MAN Diesel & Turbo’s century-long experience and expertise in the design, manufacture and maintenance of two- and four-stroke diesel engines.

**CoCoS-EDS work areas**

- **Trend analysis.** With CoCoS-EDS, operators can observe engine performance over time, compared to both measured and reference values, thus allowing early detection of abnormalities. In this way, CoCoS-EDS can detect combustion problems, component wear, contamination and other negative conditions that can lead to decreased engine performance.

- **Monitoring**
The CoCos-EDS monitoring function allows operators to survey engine operation through a set of dedicated displays showing, for example, engine-performance curves, characteristic maps and load diagrams. Any abnormal engine behaviour is accordingly indicated at an early stage, allowing operators to take appropriate action.

- **Data logging.** Engine data can be obtained online and data stored for the lifetime of the engine.

- **Reporting.** An overview of engine-performance data, from any period of time, can be produced from plant-specific, customised displays and reports.
Online Service advantages

- Optimised plant reliability and availability
- Faster troubleshooting and fault elimination
- Improved support for operators
- Necessary spare parts identified and dispatched swiftly
- Travel-cost savings as a result of remote support
- No costs incurred for deployment of additional experts
- Clear and comprehensive documentation.
**MAN L23/30DF**

**Technical data**

- **Free passage between the engines, width 600 mm and height 2,000 mm**
- **Min. distance between centre of engines:**
  - 2,250 mm (without gallery)
  - 2,600 mm (with gallery)

### Dimensions

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* Based on nominal generator efficiencies of 95%
**MAN L28/32DF**

**Technical data**

*Bore: 280 mm / stroke: 320 mm*

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<th>Speed r/min</th>
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**Dimensions**

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<td>H (mm)</td>
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<td>3,009</td>
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<tr>
<td>Dry mass (t)</td>
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<td>36.3</td>
<td>39.4</td>
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*Based on nominal generator efficiencies of 95%*

*Free passage between the engines, width 600 mm and height 2,000 mm

Q – Min. distance between centre of engines: 2,655 mm (without gallery) – 2,850 mm (with gallery)
MAN PrimeServ – World-Class Service

The MAN 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.

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

MAN 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.

Fig.6: Service centers

MAN 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.

The academy in Holeby offers comprehensive hands-on courses in operation and maintenance of MAN Dual-fuel Gensets.