

# Wärtsilä 31

Wärtsilä 31 is recognised by Guinness World Records as the world's most efficient 4-stroke diesel engine



The Wärtsilä 31 is the first in a new generation of medium speed engines, designed to set a benchmark in efficiency and overall emissions performance.

The Wärtsilä 31 is available in 8 to 16 cylinder configurations and has a power output ranging from 4.2 to 9.8 MW, at 720 and 750 rpm. The launch of the Wärtsilä 31 introduces a 4-stroke engine having the best fuel economy of any engine in its class. At the same time, it maintains outstanding performance across the complete operating range. Its modular design enables significant reductions in maintenance time and costs, thereby improving power availability and reducing the need for spare parts.



The Wärtsilä 31 retains its high efficiency and environmental values throughout the entire lifecycle of the vessel.

- Lowest fuel consumption over a wide operating range.
- Highest cylinder power in its segment, 610 kW/cylinder.
- Available in Diesel, Dual Fuel (DF) and Pure Gas (SG) versions.
- Meets the coming IMO Tier 3 regulations when operating on gas, and with an SCR when using diesel fuel. The SCR has a minimal effect on fuel consumption.
- Reliability guaranteed through extensive validation and Wärtsilä's vast manufacturing experience.
- Supported by Wärtsilä's extensive global service network.

## Typical applications

The Wärtsilä 31 is designed to be suitable for a broad range of ship types and applications, both as a main propulsion engine, in diesel-electric configurations, or as an auxiliary engine. It can be optimised for running either at constant speed or along a propeller curve. In the Offshore sector, the Wärtsilä 31 is a perfect solution for OSV's and drilling or semi-submersible vessels, where operational flexibility, high power density, long intervals between overhauls, and high levels of safety are of paramount importance.



For the power plant market, the Wärtsilä 31 is also available in a 20V cylinder configuration. A pure gas, spark ignited (SG) version is also offered.

In the cruise and ferry sector, the Wärtsilä 31 represents a particularly good investment for ferry and Ro-Pax fleet operators focusing on trimming their fuel expenses while maintaining high standards in environmental performance. Within the merchant fleet, the Wärtsilä 31 is designed for application as a main engine for small to medium sized tankers, bulk carriers, and container vessels.

### **Operational features**

The modular structure of the Wärtsilä 31 brings unprecedented multi-fuel flexibility to the market. Not only is the diesel version separately optimised for heavy or light distillate fuels, but the engine is available also as a Dual-Fuel version (burning alternatively gas or diesel) and as a pure gas engine (running uniquely on gas). This represents the ultimate in engine fuel flexibility.

The introduction of an advanced fuel injection system, combined with state-of-the-art air injection technology, enables the most efficient and economical use of low sulphur fuel oils (<0.1%S) without any restrictions on low load running, making the Wärtsilä 31 especially suited for operating in emission controlled areas. The advanced UNIC engine control system, the advanced injection system, and the variable valve timing make optimal running performance achievable at any engine load. Low and part load running, as well as transient performance, are assured. The overall operational benefits also include smokeless operation and superior load acceptance.

### **Smart maintenance – more uptime**

The engine is designed for long periods of maintenance-free operation. While most engines with a similar output

require maintenance at intervals of approximately 2,000 hours, the Wärtsilä 31's maintenance schedule intervals are four times longer, i.e. after 8,000 hours.

This, and the maintenance-friendly design, increases uptime, promotes scheduling, and cuts operating costs.

### **Modular design**

The modular design of the Wärtsilä 31 reduces the time spent on maintenance. The shift from single parts to exchange units, such as for example the power units, injectors and HP fuel pumps, enables easier and more efficient maintenance work and, therefore, maximized uptime.

The modular design also enables fast and efficient engine conversions. Thanks to the standardized component interfaces, engines can be converted to use different fuels, for example from diesel to gas, without any machining. Utilizing exchange units for the conversion will reduce the time needed.

The modern Wärtsilä 31 engine documentation increases the efficiency of both the planning and the actual maintenance work. The Operation and Maintenance Manual contains work cards explaining the work steps as well as the needed spare parts and tools. In addition to a large amount of spare part kits and spare part sets, the Wärtsilä 31 spare parts catalogue also includes exchange units.

### **Asset performance management**

#### **Service Agreements**

Wärtsilä's long-term Service Agreements provide customers with assured high availability of their equipment, and with operational flexibility. A long-term



The new car and passenger ferry being built for Danish operator Mols-Linien, will be powered by two 8-cylinder Wärtsilä 31 main engines. "The selection of this particular engine was based on the unique efficiency for the required output, and also the favourable maintenance intervals it allows," says Flemming Kristensen, Technical Director, Mols-Linien A/S.

Wärtsilä's propulsion solution provides the efficiency and environmental sustainability needed for the new purse seiner/trawler being built by Danish shipbuilder Karstensen Shipyard. Wärtsilä's scope includes the Wärtsilä 31 engine which has established a new benchmark in terms of fuel efficiency, and the Wärtsilä 2-speed gearbox which provides additional fuel savings and lower noise levels.

The Wärtsilä 31 engine, has been selected to power a state-of-the-art new generation icebreaker currently under construction at the PJSC Vyborg Shipyard. With its operational flexibility, outstanding performance even in the most severe climatic conditions, and its new approach to maintenance, it was the perfect choice for this extremely modern icebreaker.



Service Agreement with fixed prices for everything from maintenance planning to availability of spare parts and manpower, and from technical support to training, enables excellent financial predictability. A Service Agreement with the emphasis on optimised maintenance is a proven way of preventing the unexpected, and of ensuring the highest levels of productivity and profitability from the installation throughout its entire lifecycle.

**Asset Performance Services**

Through intelligent data acquisition and advanced analytics, Wärtsilä is able to optimise and increase the availability of customer's assets. Real-time remote access to operational data enables advanced support and immediate response to ensure the safe operation of the installation, regardless of its location. Experienced specialists are available to give prompt response and advice to the crew or operating team via phone and e-mail, reducing the need for unscheduled maintenance visits.

**Online Services**

Wärtsilä's Online Services provide access to technical information regarding the installation and equipment, such as bulletins, interactive manuals and service history. Via Online Services you can also create and manage technical requests, check the availability and price of spare parts, create orders, track and trace deliveries, and much more.

**Key business benefits:**

- Improved operational availability
- Increased servicing efficiency
- Easy to convert
- Increased efficiency in planning and carrying out maintenance
- Increased speed and flexibility of operations via Asset Performance and Online Services



Wärtsilä 31		IMO Tier II or III	
Cylinder bore	310 mm	Fuel specification: Fuel oil	
Piston stroke	430 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output Diesel	610 kW/cyl	ISO 8217, category ISO-F-RMK 700 ISO-F-DMA, ISO-F-DMB, ISO-F-DMZ, ULSF Gas: Methane number ≥ 80	
Cylinder output Dual-Fuel	550 kW/cyl		
Diesel	30.1 bar		
Dual-Fuel	27.1 bar		
Piston speed	10.75 m/s	SFOC 170.6 g/kWh, for diesel and 7285 kJ/kWh for DF in gas mode at ISO conditions	

Rated power	
Engine type	kW
Wärtsilä 8V31	4880
Wärtsilä 10V31	6100
Wärtsilä 12V31	7320
Wärtsilä 14V31	8540
Wärtsilä 16V31	9760

Engine platform	A*	A	B	C	F	Weight (tons)
Wärtsilä 8V31	6175	6114	3205	3113	1496	56.7
Wärtsilä 10V31	6813	6754	3205	3113	1496	62.0
Wärtsilä 12V31	7900	7840	2628	3500	1496	73.0
Wärtsilä 14V31	8540	8480	2660	3500	1496	81.0
Wärtsilä 16V31	9130	9070	2660	3500	1496	89.0

