

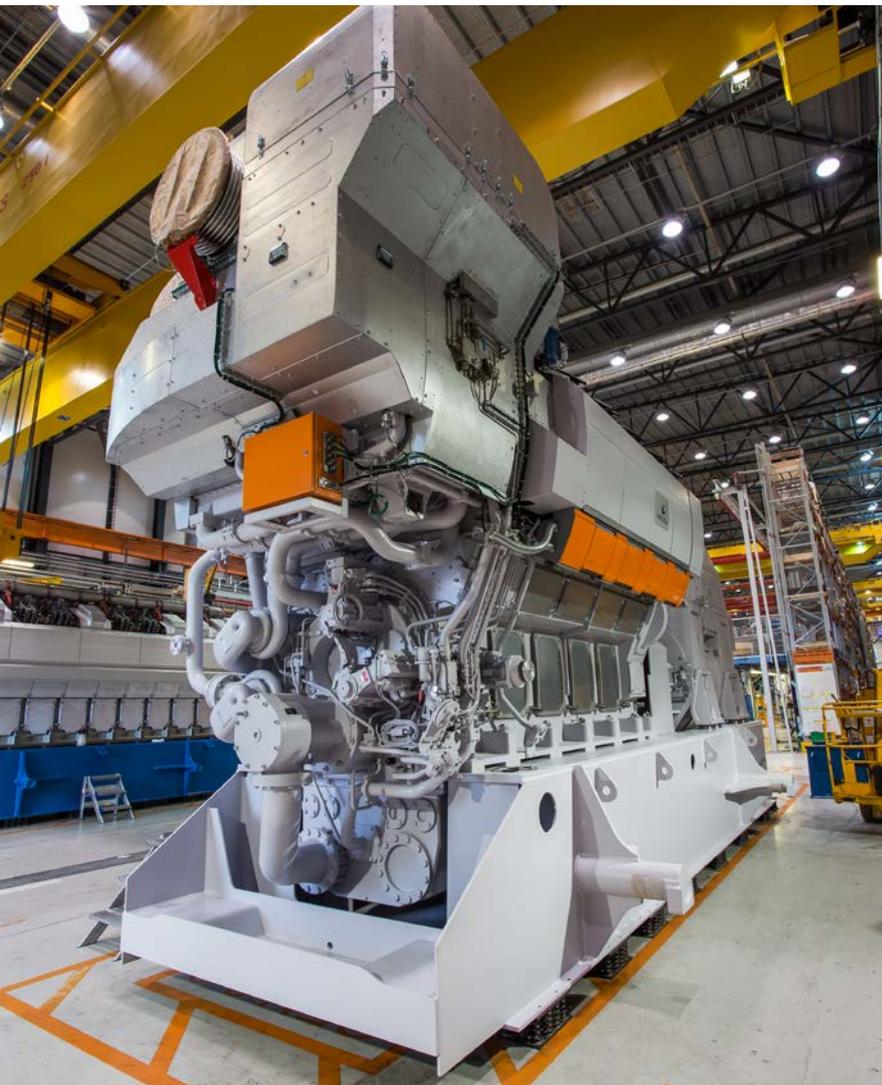
Wärtsilä 31

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.

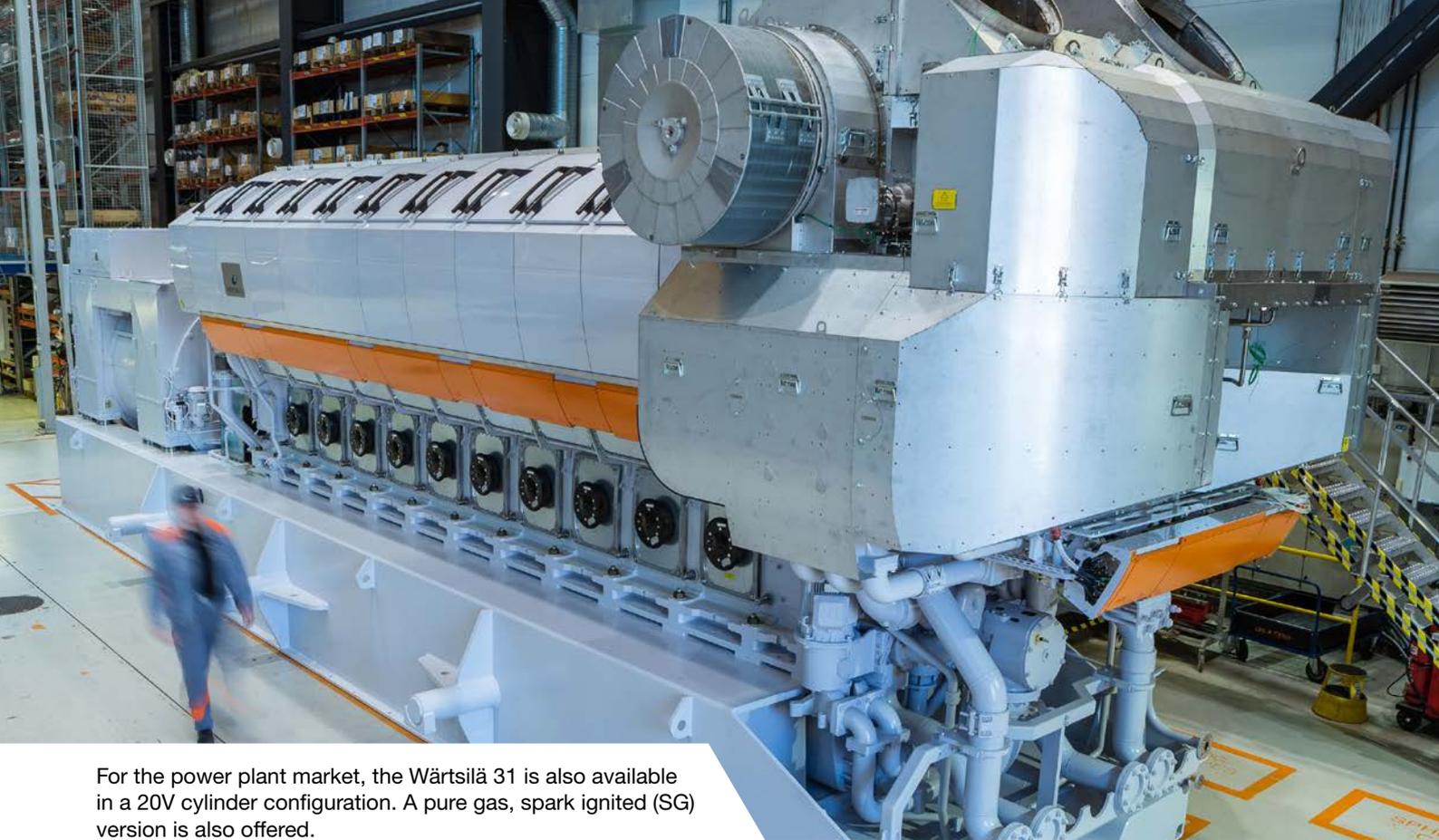


The Wärtsilä 31 retains its high efficiency and environmental values throughout the entire lifecycle of the vessel.

- 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.
- 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, such as a main propulsion engine, in diesel-electric configurations, in hybrid installations 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, enables the most efficient and economical use of low sulphur fuel oils (<0.1%S), 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. Harnessing the experience and results from extensive endurance testing in the field on on

existing Wärtsilä products design improvements have been incorporated throughout, enabling a significant increase in time between overhaul for major components.

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



Type: Supply Vessel
 Owner: Aker Biomarine
 1 x Wärtsilä 8V31



Type: RoPax
 Owner: MolsLinien
 2 x Wärtsilä 8V31



Type: Fast ferry
 Owner: Baleària
 4 x Wärtsilä 16V31DF



Type: RoPax
 Owner: Viking Line MoS
 6 x Wärtsilä 10V31DF



Type: Processing vessel
 Owner: Hav Line
 1 x Wärtsilä 10V31



Type: Chemical tankers
 Owner: Donsötank
 2 x 1 x Wärtsilä 10V31DF



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

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.

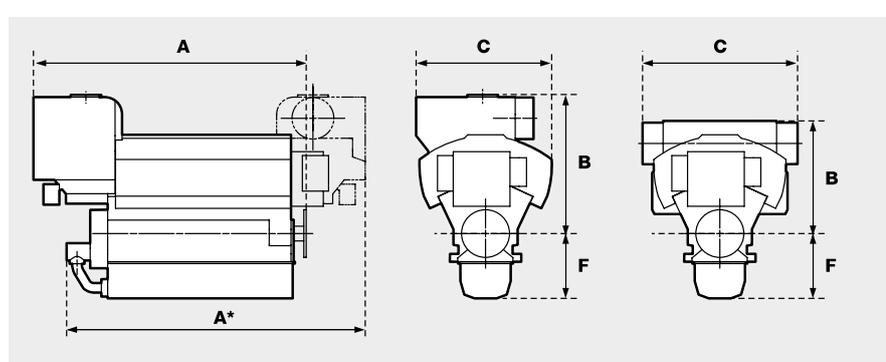
Main data

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	610 kW/cyl	ISO 8217, category ISO-F-RMK 700	
Speed	750 rpm	SFOC 167.7 g/kWh at ISO conditions	
Mean effective pressure	30.1bar		
Piston speed	10.75 m/s		

Engine dimensions (mm) and weights (tonnes)						
Engine type	A*	A	B	C	F	Weight
8V31	6175	6114	3205	3115	1496	56.3
10V31	6813	6754	3205	3115	1496	65.6
12V31	7900	7840	3137	3500	1496	77.1
14V31	8540	8480	3137	3500	1496	84.6
16V31	9130	9070	3137	3500	1496	93.3

Wärtsilä 31DF & 31SG		IMO Tier III	
Cylinder bore	310 mm	Fuel specification (31DF): Fuel oil	
Piston stroke	430 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	550 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	750 rpm		
Mean effective pressure	27.2bar	BSEC, 31DF: 7300 kJ/kWh	
Piston speed	10.75 m/s	BSEC, 31SG: 7243 kJ/kWh	

Engine dimensions (mm) and weights (tonnes)						
Engine type	A*	A	B	C	F	Weight
8V31DF & SG	6 180	5 585	3205	3115	1496	56.8
10V31DF & SG	6 820	6 225	3205	3115	1496	66.1
12V31DF & SG	7 500	6 905	3137	3 500	1496	77.7
14V31DF & SG	8 140	7 545	3137	3 500	1496	85.3
16V31DF & SG	8 780	8 185	3137	3 500	1496	94.1



Rated power

Wärtsilä 31		Wärtsilä 31DF & 31SG	
Engine type	kW	Engine type	kW
8V31	4 880	8V31DF & SG	4 400
10V31	6 100	10V31DF & SG	5 500
12V31	7 320	12V31DF & SG	6 600
14V31	8 540	14V31DF & SG	7 700
16V31	9 760	16V31DF & SG	8 800

DF = Dual Fuel, SG = Pure Gas (Spark Gas)

www.wartsila.com

WÄRTSILÄ® is a registered trademark. Copyright © 2019 Wärtsilä Corporation. Specifications are subject to change without prior notice.

WÄRTSILÄ