

Wärtsilä 46DF



The Wärtsilä 46DF is a four-stroke dual-fuel engine that can be run on natural gas, heavy fuel oil (HFO) or marine diesel oil (MDO). The engine can smoothly switch from gas fuel to HFO/MDO operation and vice versa without loss of power or speed. The Wärtsilä 46DF design is based on the well proven and reliable Wärtsilä 46F and Wärtsilä 50DF engine families, which have operated successfully on the market since the early 2000s.

Both engines have an outstanding track record, with more than 900 engines in operation and over 10 million running hours experience using Wärtsilä's leading DF technology.

The Wärtsilä 46DF extends Wärtsilä's dual-fuel engine family by covering the power range from 6.8 MW to 18.3 MW at 600 rpm.

Application Flexibility

The Wärtsilä 46DF is designed for a broad range of marine applications. Thanks to its fuel flexibility and the modular, compact design, the engine

can be optimized for constant speed diesel electric operation. It also meets the need for direct drive main engine propulsion, operating at either constant speed or along a combinator curve. The multi-fuel operation capability offers new machinery opportunities for various vessel applications.

The Wärtsilä 46DF is an optimal prime mover solution for, amongst others:

- LNG Carriers
- Cruise ships
- RO-RO/PAX
- Ferries
- Large Offshore Units

Key Benefits

- IMO Tier III Compliant
- Lowest gas fuel consumption in the industry
- Lowest fuel oil consumption in the industry
- Most powerful 4-stroke gas engine on the market
- Fuel flexibility
- Proven and reliable dual-fuel technology
- Long overhaul intervals
- Low exhaust gas emissions
- Low gas feed pressure
- Embedded automation system



Technology and Operation Advantages

Wärtsilä's proven dual-fuel technology enables owners and operators to choose both gas and liquid fuel, and switch between the two according to cost, availability, and local environmental regulations. The switch between fuel types is made without loss of power or speed. The engine automation adapts automatically to the relevant fuel selection, both in normal and emergency modes.

In gas mode, the natural gas is fed to the engine at low pressure. This facilitates a simpler and space saving engine room configuration, while providing easier and faster maintenance activities.

The engine's gas piping is double-walled as standard, and the advanced integrated automation system enables enhanced safety and local monitoring. This leads to safer and more reliable operations, under all conditions. The complete built-in automation minimizes the need for external controls, thus saving engine control room space.

The Wärtsilä 46DF is available with a choice of two performance criteria, depending on the application and customer requirements. The prime mover machinery can be optimized for either:

Power - to produce the best available power per weight ratio in its class, or

Efficiency - to give outstanding fuel energy consumption performance across the entire operating range regardless of the fuel mode selected.



Wärtsilä 46DF		IMO Tier III	
Cylinder bore	460 mm	Fuel specification: Fuel oil	
Piston stroke	580 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	1145 kW/cyl	ISO 8217, category ISO-F-DMX, DMA & DMB	
Speed	600 rpm		
Mean effective pressure	23.8 bar	BSEC 7530 kJ/kWh @85%MCR BSGC 7485 kJ/kWh @85%MCR	
Piston speed	11.6 m/s		

Rated power

Engine type	kW
6L46DF	6 870
7L46DF	8 015
8L46DF	9 160
9L46DF	10 305
12V46DF	13 740
14V46DF	16 030
16V46DF	18 320

Engine dimensions (mm) and weights (tonnes)

Engine type	A	A*	B	C	F	Weight
6L46DF	8 953	8 670	3 255	3 185	1 430	102
7L46DF	9 773	9 635	3 255	3 185	1 430	118
8L46DF	10 590	10 310	3 445	3 185	1 430	130
9L46DF	11 413	11 130	3 445	3 185	1 430	146
12V46DF	10 350	11 120	3 670	4 555	1 620	184
14V46DF	11 400	12 170	3 670	4 555	1 620	223
16V46DF	12 700	13 450	3 860	5 174	1 620	235

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Dual-fuel vs conventional diesel
Case study subject: ROPAX
45 MW installed
6500 hours/year sailing

- Fuel bill savings up to 10M 4/year
- 30000 ton/year less CO₂ emissions

- 1800 ton/year less NO_x emissions
- 75 ton/year less SO_x emissions
- 25 ton/year less particulate emissions

Assumptions:
MDO Price 620 4/ton, GAS price 410 4/ton

