

# Wärtsilä 50DF



The WÄRTSILÄ® 50DF tri-fuel engine is the ultimate ‘fuel flexibility’ solution. It is a four-stroke engine that runs on light fuel oil (LFO) or heavy fuel oil (HFO), and can switch over from gas to LFO/HFO and vice versa smoothly during engine operation. The Wärtsilä 50DF is manufactured in configurations from 6L up to 16V giving 950/975 kW per cylinder and a total maximum mechanical output of 15,600 kW. The engine speed is 500 or 514 rpm for use with 50 or 60 Hz applications. The engine has a maximum thermal efficiency of 47%, higher than for any other gas engine.

## Typical Application Areas

Wärtsilä 50DF is suitable for a wide range of applications in various respects. Thanks to modular and compact design the engine can be installed and optimised for constant speed generating sets as well as variable speed for mechanical drive applications for main engines.

Utmost power-to-weight and power-to-space ratios of the Wärtsilä 50DF offer various machinery opportunities

for different vessel applications. The Wärtsilä 50DF can be installed as mechanical drive prime mover for smaller applications, like small cargo vessels, ferries or tug boat installations. Wärtsilä 50DF is also optimal for genset application for a wide range of vessel types. Flexibility in engine support arrangements allows optimised rigid or flexible foundation for a wide range of application types in marine and land based power solutions.

## Key Benefits

- Proven and reliable heavy fuel technology
- Easy and cost-effective installation
- Long overhaul intervals
- Low exhaust gas emissions
- Fuel economy over the entire engine operation range
- Minimal consumables thanks to modular design
- Embedded automation system



## Operation Features

The engine can be switched automatically from fuel oil to gas operation at loads below 80% of the full load. Transfer takes place automatically after the operator's command without load changes. During switchover, which lasts about one minute, the fuel oil is gradually substituted by gas.

In the event of for instance a gas supply interruption, the engine converts from gas to fuel oil operation at any load instantaneously and automatically. Furthermore, the separate liquid fuel system makes it possible to switch over from LFO to HFO without load reduction. The pilot fuel is in operation during HFO operation to ensure nozzle cooling. The pilot fuel consumption is less than 1% of full load fuel consumption. Switching over to LFO from HFO operation can also be done without load reduction. From LFO to gas operation, the switch can be made as described above. This operation flexibility is the real advantage of the tri-fuel system.

## Lifecycle Costs

The fact that the Wärtsilä 50DF has originally been designed to operate reliably with the poorest quality heavy fuel, makes the Wärtsilä 50DF ultimate in reliable performance using light diesel oils. Overhaul intervals up to 24,000 hours and maintenance-friendly design are some of the main valuable features experienced with more than four thousand Wärtsilä 50DF engines installed since the launch in 1992. Thanks to the Variable Inlet Valve Closing system included as standard in the Wärtsilä 50DF engine family, the fuel economy has been improved especially at low engine loads.

The Wärtsilä 50DF engine is fully compliant with the IMO Tier II exhaust emissions regulations set out in Annex VI of the MARPOL 73/78 convention.



Wärtsilä 50DF		IMO Tier III, EPA T3	
Cylinder bore	500 mm	Fuel specification: Fuel oil	
Piston stroke	580 mm	700 cSt/50°C	7200 sR1/100°F
Cylinder output	975 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB	
Speed	514 rpm		
Mean effective pressure	20.0 bar	BSEC 7520 kJ/kWh BSGC 7470 kJ/kWh	
Piston speed	9.9 m/s		

BSEC/BSGC are given at the following conditions:  
Values apply for reference conditions ISO 15550 : 2002 (E). With engine driven pumps (two water pumps, one lubricating oil pump and pilot fuel pump). With 5% tolerance

Rated power	
Engine type	kW
6L50DF	5 850
8L50DF	7 800
9L50DF	8 775
12V50DF	11 700
16V50DF	15 600

Engine dimensions (mm) and weights (tonnes)						
Engine type	A	B	C	D	F	Weight
6L50DF	8 120	3 475	3 270	4 000	1 455	96
8L50DF	10 270	3 920	3 505	4 000	1 455	128
9L50DF	11 140	3 920	3 505	4 000	1 455	138
12V50DF	10 425	4 240	3 810	3 600	1 500	175
16V50DF	13 830	4 400	4 730	3 600	1 500	220

