



# Wärtsilä 20DF

## Fuel flexibility and reliability for a wide range of vessel applications

The Wärtsilä 20DF is a four-stroke dual-fuel engine that can be run on natural gas, marine diesel oil (MDO) or heavy fuel oil (HFO). The engine can smoothly switch from gas to MDO/HFO and vice versa during engine operation without power interruption. The Wärtsilä 20DF is based on the proven and reliable Wärtsilä 20 diesel engine which was introduced to the market in the early 1990s.

### Application flexibility

The Wärtsilä 20DF offers full fuel flexibility, enabling it to be installed and optimised for constant speed generating sets in larger vessels and as a main engine for both mechanical and electric propulsion.

The multi-fuel capability makes it an ideal choice for various vessel applications including hybrid installations. Typical installation examples include RoPax and merchant vessels. The compact and lightweight Wärtsilä 20DF is also ideal as a mechanical drive prime mover for applications such as small cargo vessels, ferries or tug boat installations.

### Key benefits

- Fuel and application flexible
- Proven and reliable dual-fuel technology
- Extended time between overhauls
- Low sensitivity to varying fuel quality
- Low exhaust gas emissions
- Low gas feed pressure
- Embedded automation system for safe and optimised operation

## Fuel flexibility

One of the main features of the proven dual-fuel technology is that the engine can be switched from fuel oil to gas operation or vice-versa. The switch can be made seamlessly without loss of power or speed. Such fuel flexibility enables compliance with emission regulations in controlled areas, while giving operators the option of determining the fuel according to cost and availability. Transfer takes place automatically after the operator's command without power interruption, or instantly in case of a gas supply interruption. Furthermore, the separate liquid fuel system makes it possible to switch over from MDO to HFO without power interruption.

The natural gas is supplied to the engine through a gas valve unit, where the gas is filtered and gas pressure is controlled. The system includes the necessary shut-off and venting valves to ensure safe and trouble-free low pressure gas supply. The gas is supplied through a large manifold running along the engine. Each cylinder then has an individual feed pipe to the gas admission valve close to the cylinder head. The gas piping is of double wall design as standard.

When running the engine in gas mode, the air/gas mixture is ignited with a small quantity of MDO pilot fuel. The amount of pilot fuel is optimised for optimal combustion by the embedded engine speed and load control and the monitoring system.

The advanced automation system provides a complete engine safety system and local monitoring. Thanks to the complete automation integration the external control system is significantly reduced which saves space in the engine control room.

## Environmental compliance

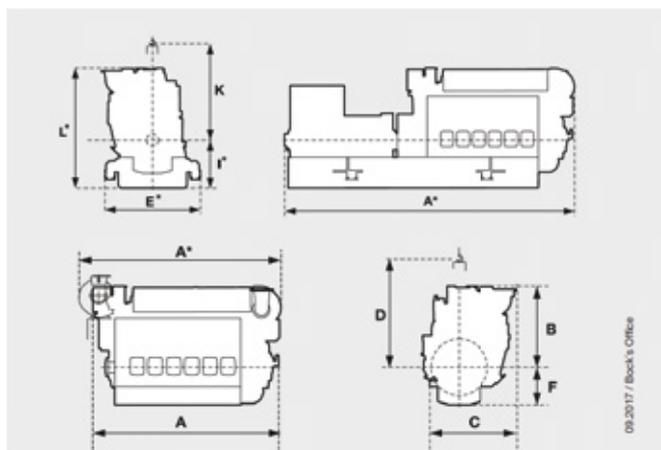
The dual-fuel technology brings outstanding benefits to ship owners and operators. The Wärtsilä 20DF operates on the lean burn principle: the mixture of air and gas in the cylinder contains more air than is needed for complete combustion. Lean combustion reduces peak temperatures and therefore NO<sub>x</sub> emissions. The engine offers you alternatives to optimise your operations. In gas mode, the engine is already compliant with IMO Tier III regulations without any secondary exhaust gas purification systems. Dual-fuel technology offers alternatives to optimise SO<sub>x</sub> and CO<sub>2</sub> emissions as well as smokeless operation in gas operation mode. In liquid fuel oil mode, the Wärtsilä 20DF engine is fully compliant with the IMO Tier II exhaust emissions regulations and it can reach IMO Tier III with the Wärtsilä NO<sub>x</sub> Reducer (NOR) exhaust treatment solution.

Item		IMO Tier III
Cylinder bore	200 mm	Fuel specification: Fuel oil
Piston stroke	280 mm	700 cSt/50°C, 7200 sR1/100°F
Cylinder output	160/195 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB
Speed	1000/1200 rpm	
Mean effective pressure	22.0, 22.2 bar	BSEC 8100 kJ/kWh, BSGC 7900 kJ/kWh
Piston speed	9.3, 11.2 m/s	
Generator voltage	0.4–13.8 kV	
Generator efficiency	0.95–0.96	

Rated power				
Engine type	60Hz		50Hz	
	195 kW/cyl, 1200 rpm		160 kW/cyl, 1000 rpm	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L20DF	1 170	1 123	960	920
8L20DF	1 560	1 498	1 280	1 230
9L20DF	1 755	1 685	1 440	1 380

Genset dimensions (mm) and weight (tonnes)						
Engine type	A*	E	I*	K	L*	Weight
6L20DF	5 325	2 070	1 025/1 075	1 800	2 731	16.9
8L20DF	6 030	2 070	1 075/1 125	1 800	2 781	20.8
9L20DF	6 535	2 300	1 800	1 800	2 831	23.9

Engine dimensions (mm) and weight (tonnes)							
Engine type	A*	A	B	C	D	F	Weight
6L20DF	3 254	3 108	1 705	1 690	1 800	624	9.4
8L20DF	3 973	3 783	1 705	1 824	1 800	624	11.1
9L20DF	4 261	4 076	1 705	1 824	1 800	624	11.7



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