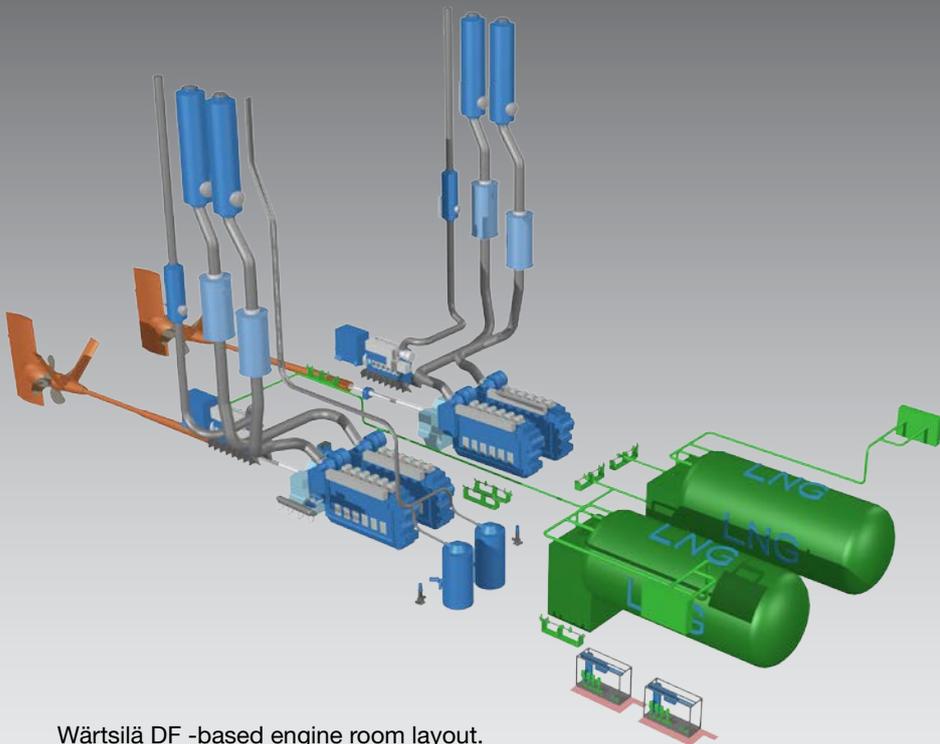


# Wärtsilä 20DF



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 switch over from gas to MDO/HFO and vice versa smoothly during engine operation without power interruption. The Wärtsilä 20DF design is based on the well proven and reliable Wärtsilä 20 diesel engine which was introduced on the market in the early 1990s. Wärtsilä 20DF completes the lower power range in the dual-fuel Wärtsilä engine family.



Wärtsilä DF -based engine room layout.

## Application Flexibility

Wärtsilä 20DF is suitable for a wide range of applications. Thanks to fuel flexibility the engine can be installed and optimised for constant speed generating sets as well as variable speed mechanical drives for main engine applications.

The multi-fuel operation capability offers new machinery opportunities for various vessel applications. The Wärtsilä 20DF can be installed to complete the multi-fuel engine room concept as generating set next to Wärtsilä 31DF, 34DF, 46DF or 50DF main propulsion machinery. Typical installation examples are RoPax or LNG carriers. The compact and light Wärtsilä 20DF fits perfectly also as mechanical drive prime mover for smaller applications, such as small cargo vessels, ferries or tug boat installations.

Wärtsilä 20DF is also optimal for harbour genset application for a wide range of vessel types.

## Key Benefits

- Fuel flexibility
- Application 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

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. 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 fuel switch from liquid to gas operation mode can be made as described above. This operation flexibility is a real advantage with the dual-fuel system.

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. On the engine, 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. 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 best combustion by the embedded engine speed & load control and monitoring system.

The advanced automation system provides complete engine safety system and local monitoring. Thanks to built-on complete automation integration the external control system is significantly reduced which obviously 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. In gas mode, the engine is already compliant with IMO Tier III regulations without any secondary exhaust gas purification systems. Dual-fuel technology offers reduced 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 set out in Annex VI of the MARPOL 73/78 convention.



Wärtsilä Genset 20DF		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	160/185 kW/cyl	ISO 8217, category ISO-F-DMX, DMA and DMB
Speed	1000/1200 rpm	
Mean effective pressure	22.0, 21.0 bar	BSEC 8390 kJ/kWh BSGC 8220 kJ/kWh
Piston speed	9.3, 11.2 m/s	
Generator voltage	0.4–13.8 kV	
Generator efficiency	0.95–0.96	

Engine type	60 Hz		50 Hz	
	Engine kW	Gen. kW	Engine kW	Gen. kW
6L20DF	1 110	1 065	960	920
8L20DF	1 480	1 420	1 280	1 230
9L20DF	1 665	1 600	1 440	1 380

Genset dimensions (mm) and weights (tonnes)						
Engine type	A*	E	I*	K	L*	Weight
6L20DF	5 325	2 070	895/975/1025	1 800	2 731	16.9
8L20DF	6 030	2 070	1025/1075	1 800	2 781	20.8
9L20DF	6 535	2 300	1075/1125	1 800	2 831	23.9

Engine dimensions (mm) and weights (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

