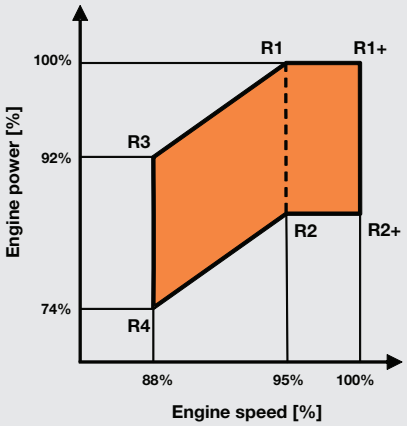
WÄRTSILÄ **Engines**

Wärtsilä X92

ENERGY
ENVIRONMENT
ECONOMY

At Wärtsilä, we are passionate about optimising lifecycle value by offering precisely what each of our customers need. We can deliver on this promise because we provide the only true total offering of marine products, integrated solutions and services in the industry – worldwide. We help our customers find the shorter route to robust growth and bigger profits through operational efficiency, environmental excellence, fuel flexibility and services. Even though this brochure is just a beginning to learn why Wärtsilä nowadays powers one in every three ships worldwide, it still demonstrates how we are able to customise our comprehensive offering in order to give customers a crucial competitive edge. What can we do for you?



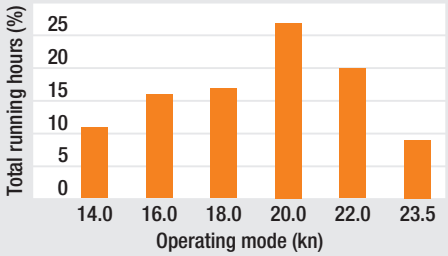
Wärtsilä X92 rating field

WÄRTSILÄ X92 CASE STUDY

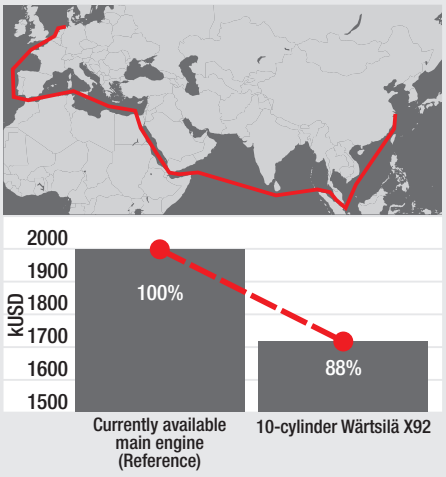
13,200TEU Container vessel: Asia – Europe (Shanghai, Ningbo, Singapore, Rotterdam, Bremerhaven) comparison

Sailing profile

- Distance: 10,726 nm/leg
- HFO price = 650 USD/tonne



FUEL COSTS/LEG (kUSD)



HFO price = 650 USD/tonne

The Wärtsilä X92 is the marine two-stroke diesel engine designed to provide propulsion power for modern large and ultra large container vessels following the latest trends in container vessel propulsion. The combination of the large bore, long stroke, and low shaft speeds together with the advanced proven common-rail technology results in an engine with particularly high efficiency and environmental performance.

The Wärtsilä X92, which has a cylinder bore of 920 mm, provides a power output of 24,420 to 73,560 kW and is available in 6–12 cylinder configurations.

The key benefits of the Wärtsilä X92 include:

- Extra low fuel consumption over the whole operating range together with low cylinder oil consumption
- Flexibility of optimum rpm selection to enable increased propeller diameter
- Stable operation down to 12% nominal engine speed for slow steaming
- Reduced CO_2, SO_X and NO_X emissions, offering shipyards excellent possibilities for improved EEDI

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TYPICAL APPLICATION AREAS

The Wärtsilä X92 has been designed as a main engine for large and ultra large container vessels of 8000TEU and beyond. The Wärtsilä X92 engine offers flexibility for changing market conditions, providing minimum daily fuel consumption. When comparing the Wärtsilä X92 to previous generation main engine options, a gain of approximately 10% and beyond in daily fuel consumption can be achieved. This can be attributed mainly to the low shaft speeds of the engine allowing larger propeller diameters to be installed on the vessel.

OPERATIONAL FEATURES

The engine offers high efficiency due to the large bore, high stroke-to-bore ratio and Wärtsilä's well proven electronically-controlled common-rail technology which plays a key role in enabling ship owners to reduce fuel costs, mainly through the flexibility of the fuel injection and exhaust valve operations. A unique feature of Wärtsilä low-speed electronically controlled engines is the possibility to control each fuel injector separately. This flexibility results in lower fuel consumption across the entire operating range, especially at low and part loads. In addition, different engine tunings are available in order to meet specific customer requirements according to their particular needs Standard, Delta, Delta Bypass and Low Load). Other advantages of this technology include stable low running speeds (down to 12% of nominal speed), smokeless operation, and improved control of exhaust emissions. As far as cylinder lubrication is concerned, an oil feed rate of 0.6 g/kWh can be achieved. The engines are equipped as standard with intelligent combustion control (ICC) system enabling further fuel savings and balanced working of each cylinder.

ENVIRONMENTAL COMPLIANCE

The engine is fully compliant with IMO Tier II requirements. It can also be equipped with a SCR catalyst to meet IMO Tier III NO_X emission levels, and a scrubber to reduce SO_X emissions to 0.1% – even with high sulphur fuels. The introduction of the EEDI index also puts an emphasis on CO_2 emissions and total vessel efficiency. The Wärtsilä X92 internal engine efficiency, and the possibility to apply various Power Take Off (PTO) arrangements for onboard electricity production, make it easy for shipyards to meet these new requirements. Thanks to Wärtsilä's common-rail fuel injection technology, the engine has no visible smoke at any load.

TOTAL COST OF OWNERSHIP

Minimum total cost of ownership can be achieved by a low engine cost and low operational costs during the lifetime of the engine. The Wärtsilä X92 is designed for exceptional reliability and for long periods of maintenance-free operation. It also allows extended Time Between Overhaul (TBO) of the critical components, to as much as 5 years. The service-friendly design will reduce downtime, maintain vessel operation and cut operating costs. Together with Condition Based Maintenance (CBM) and service agreements, the overhaul interval can be even further extended, thus minimizing maintenance costs and maximizing the revenue-earning

Wärtsilä X92	IMO Tier II
Cylinder bore	920 mm
Piston stroke	3468 mm
Speed	70–80 rpm
Mean effective pressure at R1/R1+	21.0/20.0 bar
Stroke / bore	3.77

Rated power, principal dimensions and weights

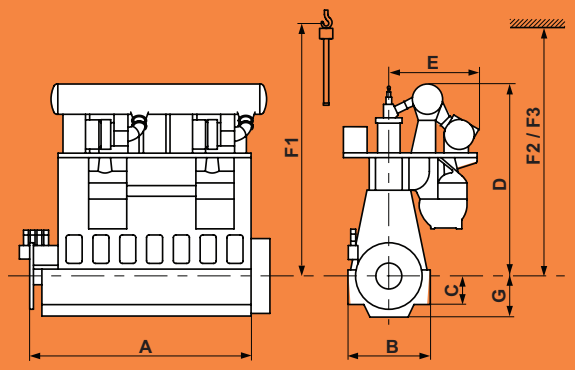
Cyl.	Output in kW at 76/80 rpm		Output in kW at 70 rpm		Length A mm	Weight tonnes
	R1 / R1+	R2 / R2+	R3	R4		
6	36 780	26 520	33 900	24 420	11 630	1 120
7	42 910	30 940	39 550	28 490	13 210	1 260
8	49 040	35 360	45 200	32 560	16 350	1 460
9	55 170	39 780	50 850	36 630	17 850	1 630
10	61 300	44 200	56 500	40 700	19 520	1 790
11	67 430	48 620	62 150	44 770	21 280	1 960
12	73 560	53 040	67 800	48 840	22 870	2 140

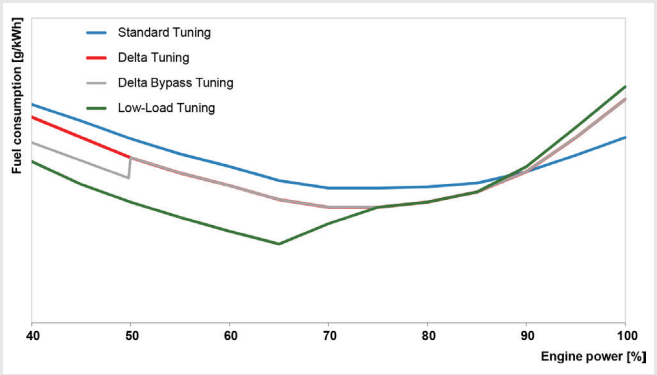
Dimensions mm	B	C	D	E
	5550	1900	12 950	6050
	F1	F2	F3	G
	15 420	15 450	14 240	2930

Brake specific fuel consumption (BSFC) in g/kWh

Full load					
Rating point		R1/R1+	R2/R2+	R3	R4
BMEP, bar		21.0/20.0	15.1/14.4	21.0	15.1
BSFC	Standard Tuning	166/165	159	166	159

Part load, % of R1/R1+	85	70	85	70	65
Tuning variant	Standard	Standard	Delta	Delta	Low-Load
BSFC	162.4/161.4	162.0/161.0	161.7/160.7	160.5/159.5	157.2/156.4





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