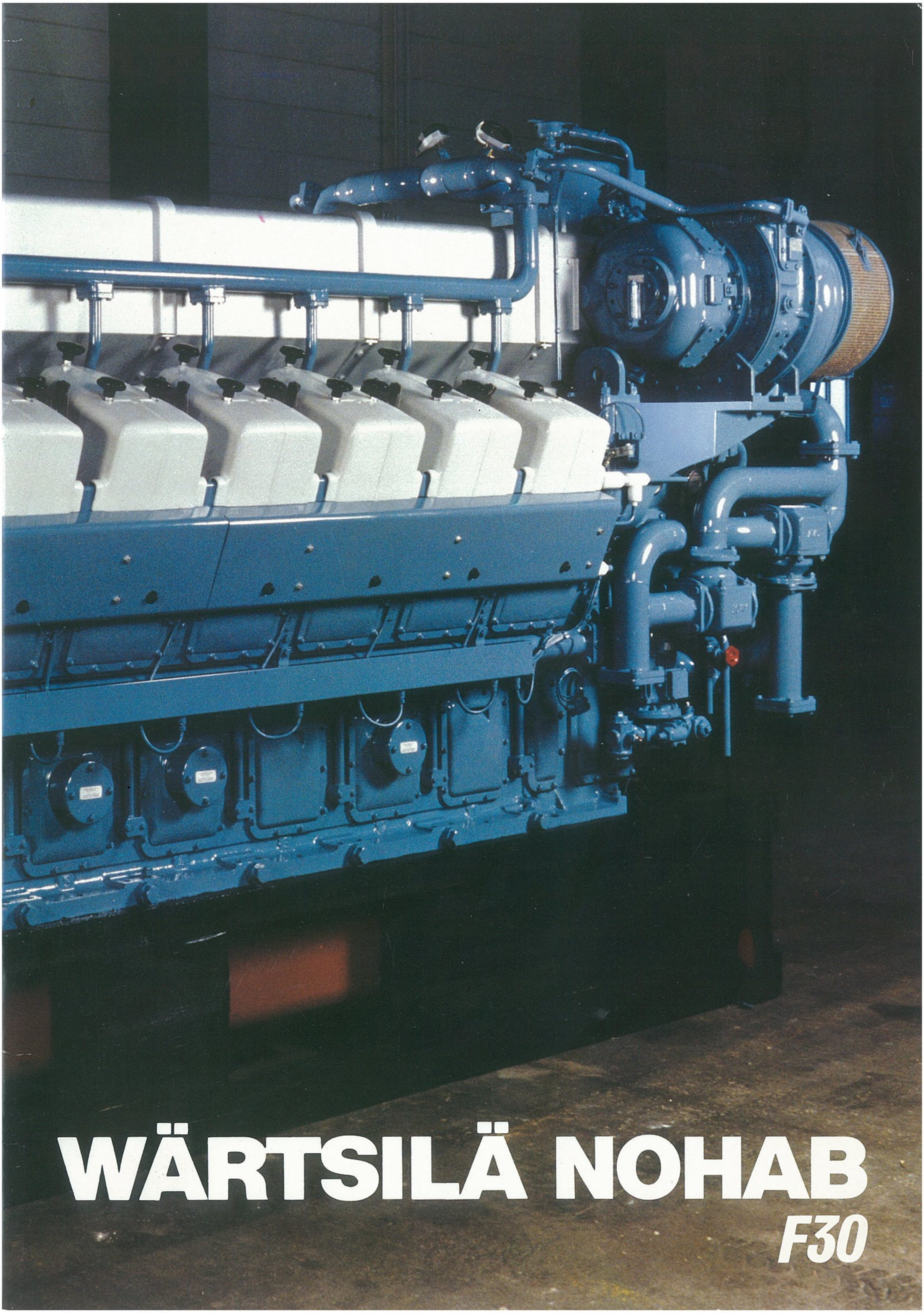


WÄRTSILÄ NOHAB

F30

Aerial view of the Wärtsilä Diesel plant at Trollhättan, Sweden.

WÄRTSILÄ DIESEL AB —a company with more than 80 years of experience in diesel engine manufacture

Wärtsilä Diesel AB follows a long tradition of design, development and manufacture of diesel engines. This tradition dates back to 1898, when a licensing agreement was signed between Rudolf Diesel and a group of Swedish financiers.

During the last fifteen years, Wärtsilä Diesel AB has concentrated on development of a series of medium-speed diesel engines which use only one cylinder size. This Wärtsilä Nohab type F engine is a four stroke, trunk type diesel engine with a bore of 250 mm and a stroke of 300 mm.

Side by side with the F-type engine production Wärtsilä Diesel AB is manufacturing the Wärtsilä Vasa 22HF engine with a bore of 220 mm and a stroke of 240 mm, output range 560 kW (760 BHP) — 2800 kW (3808 BHP).

Member of the Wärtsilä Diesel Division

Wärtsilä Diesel AB is a member of the Wärtsilä Diesel Division, Wärtsilä Diesel, which is one of the worlds leading manufacturers of medium speed diesel engines. Other Wärtsilä Diesel production units are the Vasa and Turku diesel factories in Finland, the Wartsila Diesel Normed S.A. in France and the Wartsila Diesel Singapore.

Wärtsilä Diesel belongs to the Wärtsilä Group which is one of the largest privately-owned industrial companies in Finland, with 35 production plants in 6 different countries. With more than 4500 diesel engines delivered to 45 countries, Wärtsilä Diesel has a great deal of experience in diesel engines for both marine and land-based installations.

Wärtsilä Diesel is represented via its own subsidiaries and agents in 35 countries. There are facilities for servicing and spare parts in more than 60 locations, covering even the most remote parts of the world.

Component manufacturing shop

Assembly of Wärtsilä Nohab F30 diesel engines.

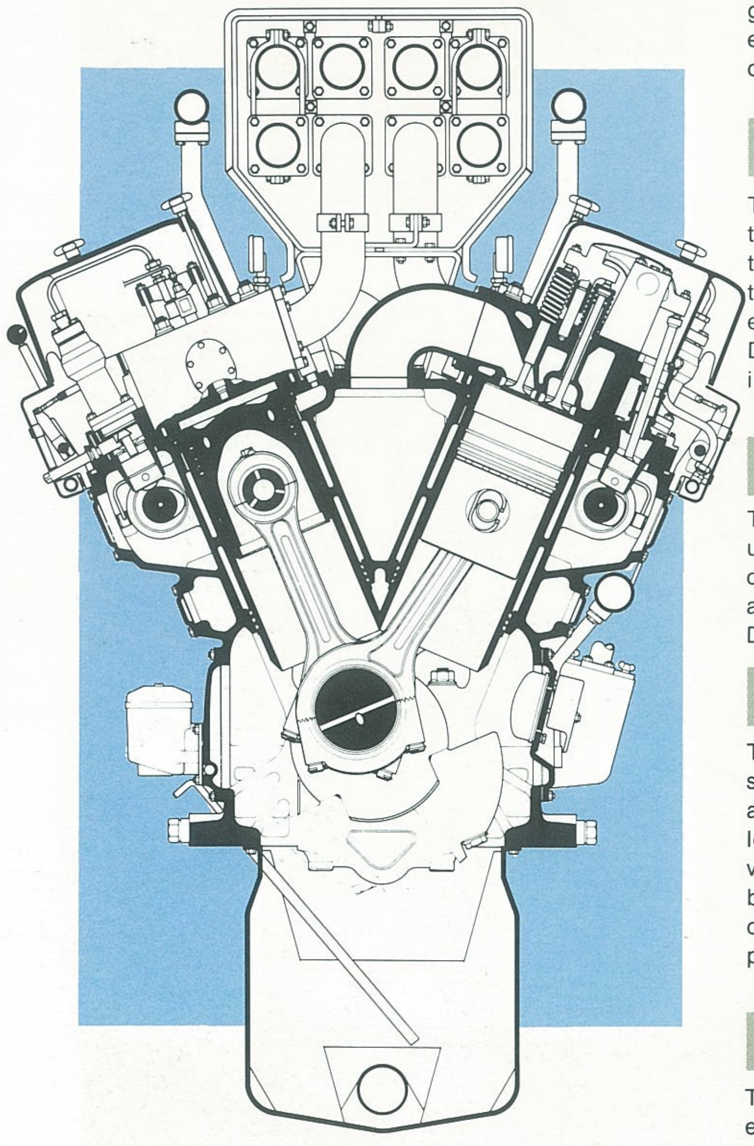
WÄRTSILÄ NOHAB F30 A for operation on distillate fuel and F30 B on heavy fuel

Engine characteristics

The Wärtsilä Nohab F30 is a further development of the F20 engine for operation on distillate fuel. Wärtsilä Nohab F30 is also available in a version for heavy fuel operation.
The advantages of the F30 include:

- low fuel consumption
- low mean piston velocity
- very good weight/power and power/cylinder capacity ratios.

High power per cylinder has been achieved, without sacrifice of safety margins or low weight, by the use of high-strength material (nodular iron) in all cast components that are exposed to heavy mechanical and thermal loads.



Economics

The power output of the engine has been set at a level which gives the user the maximum technical and economical benefit, without the need to make any concessions on reliability.

Unit philosophy

The ancillary systems of the engine have been designed in the form of units which are built-on to the engine. This simplifies engine installation and keeps down costs while at the same time reduces the risks of incorrect installation. Auxiliary equipment modules have been designed to assist in rational installation work.

Based on experience

In designing this series of engines the experience gained in operation of the predecessors of the F-series engines working under widely differing operating conditions has been applied.

Development

Theoretical calculations, and accelerated laboratory tests of temperature, stress and other factors affecting the performance of components, were followed by long-term tests under operating conditions. This series of engines has been designed in accordance with Wärtsilä Diesel's forward-looking philosophy of requiring full interchangeability of components with earlier F-engines.

Quality

The orders received for engines as emergency power units in nuclear power stations are evidence of the high quality of the products. This high quality is the result of a well-established quality control function at Wärtsilä Diesel.

Offshore applications

The engines are designed to meet high "trim and tilt" standards when installed, for example, in drilling rigs or accommodation platforms. They can also withstand long periods of idling, such as may occur in supply vessels, without excessive fouling or combustion problems. The stability requirements in many types of offshore applications make the low weight/power ratio particularly advantageous.

Service and maintenance

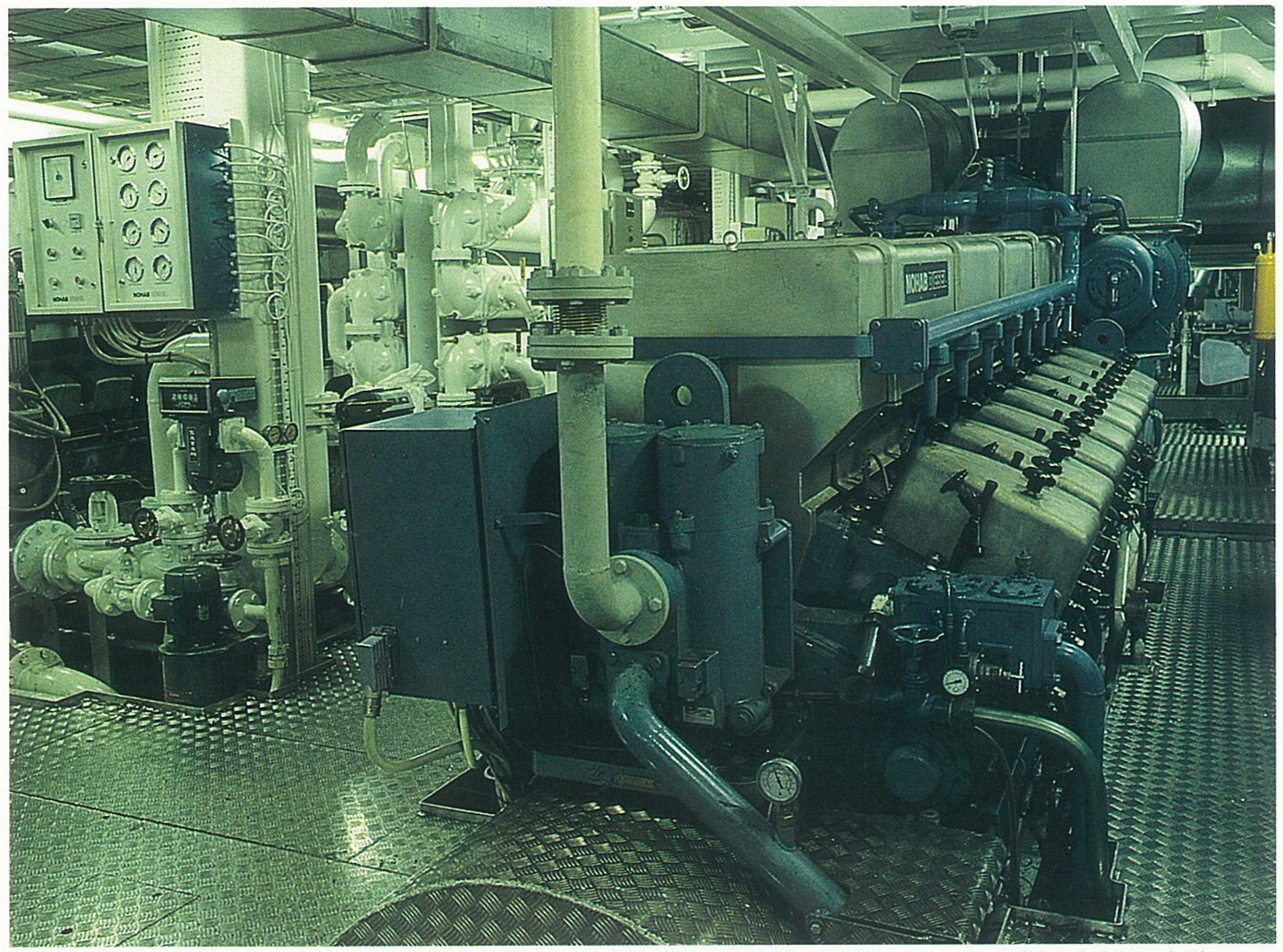
The engines are designed so that the components are easily accessible for servicing; the low weight of components also contributes to ease of servicing.
The Wärtsilä Diesel 24-hour world-wide service network helps to keep breakdown-time costs to the minimum. The comprehensive documentation supplied with the engines provides the information needed for operation, maintenance and ordering spare parts.

WÄRTSILÄ NOHAB F30 – special design features

- Single piece cylinder block — cast from nodular iron. Gives low weight and high strength.
- Tough-hardened crankshaft — forged in special steel with continuous grain flow process.
- Stepped connecting rod small ends. Gives maximum bearing area and bearing capacity.
- Four-valve nodular cast iron cylinder heads with double bottom and thin wall sections for efficient cooling of valve seats. Heavy fuel engine version provided with valve rotators and Nimonic 80A exhaust valves.
- Pulse turbocharging provides sufficient charge air at both high and low load.
- Cooling water system with integrated high/low temperature circuits and inversible heat exchange to charge air system. Gives optimum fuel combustion conditions throughout the full range of engine loading.
- Pistons for distillate fuel: Light alloy pistons with wear resistant ring carriers and oil cooling of cocktail shaker type, for maximum heat exchange in piston crown.
- Pistons for heavy fuel: Nodular cast iron pistons in one piece with hardened ring grooves.

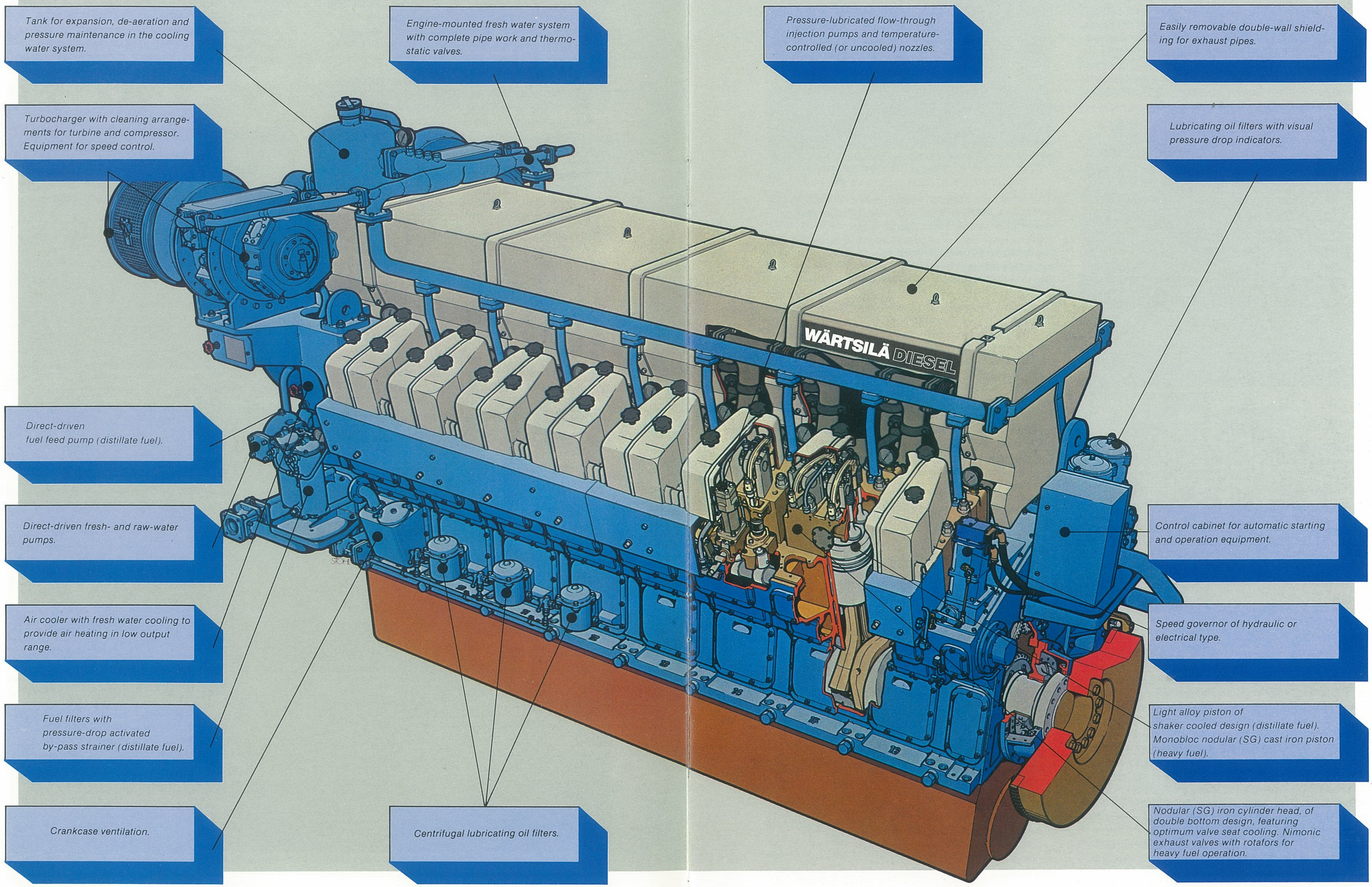
  This design gives:
  — high strength
  — low blow-by
  — low lubricating oil consumption
  — low piston clearance due to low thermal expansion.
- Lube oil system with built-on pressure regulator and main filter unit of full flow type and by-pass filter of centrifugal type. Gives high quality lubrication at all loads.
- Automatic starting system with full power air starter. Gives safe start of engine from all crankshaft positions.

Wärtsilä Nohab engines are assembled in workshops separated from other departments.



Twin-engine installation in a supply vessel with two 16-cylinder 3000 kW (4080 BHP) F316V engines. Wärtsilä Nohab standard control panels and cooler unit, are installed between the engines.

F30



Tank for expansion, de-aeration and pressure maintenance in the cooling water system.
Engine-mounted fresh water system with complete pipe work and thermostatic valves.
Pressure-lubricated flow-through injection pumps and temperature-controlled (or uncooled) nozzles.
Easily removable double-wall shielding for exhaust pipes.
Turbocharger with cleaning arrangements for turbine and compressor. Equipment for speed control.
Lubricating oil filters with visual pressure drop indicators.
WÄRTSILÄ DIESEL
Direct-driven fuel feed pump (distillate fuel).
Direct-driven fresh- and raw-water pumps.
Control cabinet for automatic starting and operation equipment.
Air cooler with fresh water cooling to provide air heating in low output range.
Speed governor of hydraulic or electrical type.
Fuel filters with pressure-drop activated by-pass strainer (distillate fuel).
Light alloy piston of shaker cooled design (distillate fuel). Monobloc nodular (SG) cast iron piston (heavy fuel).
Crankcase ventilation.
Centrifugal lubricating oil filters.
Nodular (SG) iron cylinder head, of double bottom design, featuring optimum valve seat cooling. Nimonic exhaust valves with rotafors for heavy fuel operation.

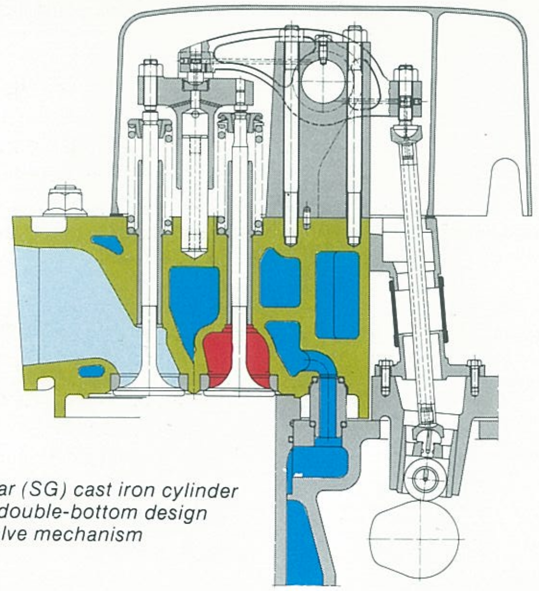
Design features

Cylinder block

The cylinder block is a nodular (SG) iron casting. Heavy longitudinal sections ensure resistance to bending moments in the block. The use of nodular cast iron contributes to the stiffness of the cylinder block, while keeping the weight low. The angle between the cylinder banks is 45° resulting in a compact engine. Charge air is led through the space between the cylinder banks. Generously dimensioned cooling passages ensure optimum temperature control. Engine handling is facilitated by lifting eyelets fitted into the cylinder block.

The F30 cylinder block is cast in nodular (SG) iron.

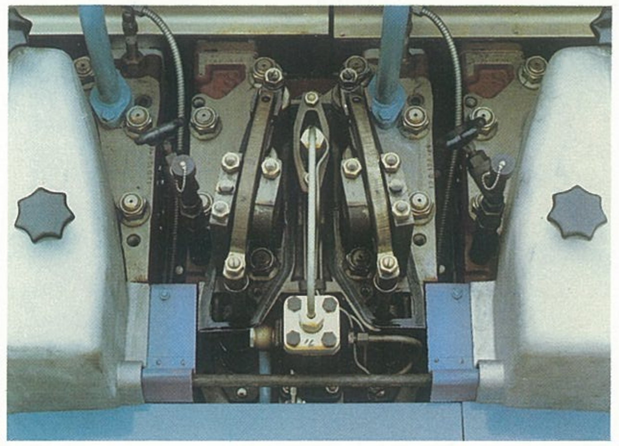
Cylinder head



Nodular (SG) cast iron cylinder head, double-bottom design and valve mechanism

The cylinder head is made from nodular cast iron. The high strength of this material ensures that the cylinder head is able to resist high thermal and mechanical loadings. The double bottom design gives a stiff structure, with minimum deformation of the flame plate and valve seatings. The absence of a starting valve contributes to the symmetrical design of the cylinder head.
The double bottom allows very efficient cooling of the flame plate and the valve seatings. A low temperature in the exhaust valve seating is achieved by optimum utilization of the properties of the nodular cast iron, together with a high rate of flow of cooling water round the valve seats.
Eight cylinder head bolts give even distribution of the forces and efficient sealing and no gasket is needed between the head and the cylinder liner.

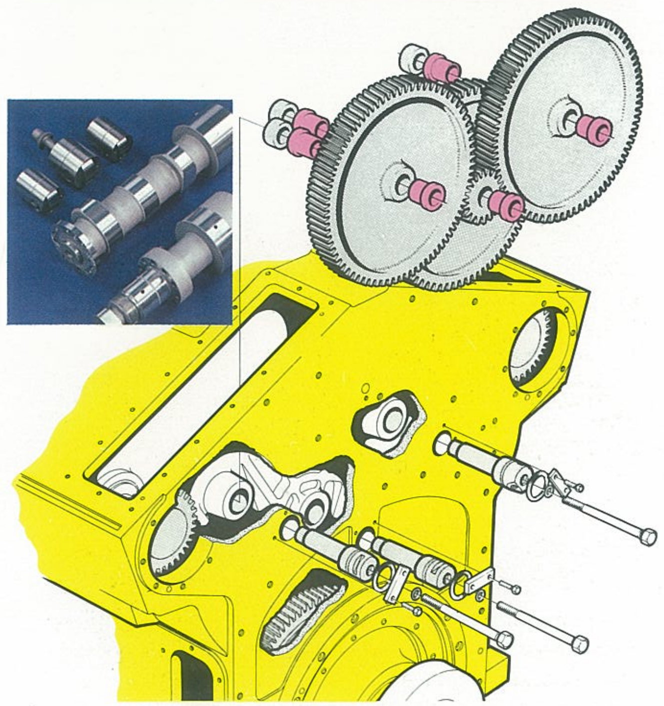
Valve mechanism



Cylinder head components. Injection equipment in the centre. Exhaust valves on the right and inlet valves on the left.

The valve mechanism is robustly built and is specially designed to resist all the forces likely to occur during different types of operating conditions.
Each cylinder head is fitted with two inlet valves, two exhaust valves, an indicator cock and a safety valve. The valves are actuated in pairs by a common valve yoke which completely eliminates any lateral forces on the valves.
Both inlet and exhaust valves are of uniform type, for distillate fuel made of high-strength stainless steel.
For heavy fuel the exhaust valves are made from homogeneous Nimonic alloy which has good high temperature strength and high corrosion resistance.
The exhaust valves are fitted with valve rotators (rotocaps) to prevent formation of deposits on the valve surfaces. The inlet valves are fitted with strengthened heads to prevent relative moment between the valve and the seating. This, together with the 30° seating angle keeps seat wear to the minimum.
Low contact pressure between the push rod and the camshaft has been achieved by careful design of the cams and followers.

Gear case and camshafts



Gear transmission for the camshafts.

The camshafts which control the intake and exhaust valves in the cylinder head as well as the fuel injection pumps, are driven by the crankshaft by means of a gear mechanism at the flywheel end of the engine. The drive gears are case hardened and helically cut and dimensioned to withstand high pressure loadings.
The shafts for the gears are fitted with drilled oilways which supply the bearing bushings and spray nozzles with oil. Spray nozzles, for cooling and lubrication, are located in all shafts and centrally in the gear case. The camshaft is journalled in white-metal lined steel bearing shells and is divided into sections, one for each cylinder unit.

Pistons

For distillate fuel the pistons are made of light alloy. The design is based on many years of successful operational experience gained from earlier type F engines.
The piston consists of a forged skirt, electronically welded to the crown. It is provided with very efficient shaker cooling, with oil from the lubricating oil system and with a cast-in ring carrier for the upper piston ring, to reduce wear.
The piston rings have been designed to minimize lubricating oil consumption and to give low contact pressure against the cylinder liner wall; the result is low cylinder wear.
For heavy fuel the pistons are cast in a single piece, from nodular cast iron. They are shaker-cooled, with oil from the lubricating oil system. The upper ring grooves in the piston are hardened to reduce groove wear. A relatively constant piston clearance can be maintained under varying engine load conditions because of the low coefficient of thermal expansions of nodular cast iron; this results in low lubricating oil consumption and low wear. The upper compression ring is made from nodular iron. The upper two rings and the scraper ring are chromium plated. The scraper ring is spring loaded; they are designed to give optimum contact pressure to ensure correct oil control and low wear of both rings and cylinder liner.

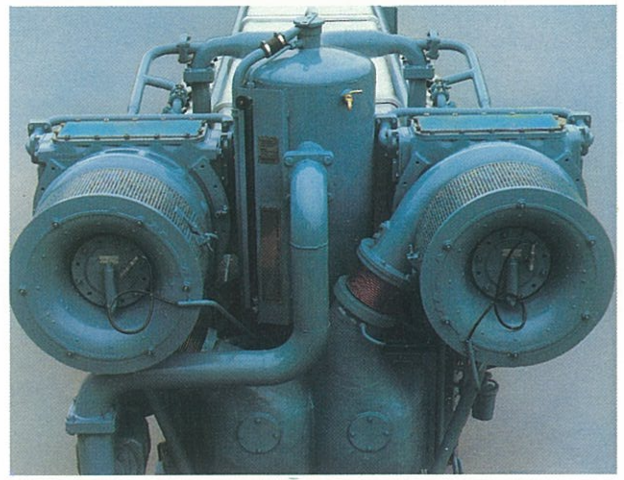
Monobloc nodular (SG) cast iron piston, connecting rod, big-end bearing, piston rings and piston pin.

Connecting rods

The connecting rods are drop-forged in steel and have H-cross-section. They are obliquely split at the bottom end bearing with serrations between the rod and the bearing cup. The four bolts can be easily and quickly tightened to the correct torque, and this ensures even distribution of the forces. The profile of the gudgeon pin bearing is stepped to give maximum bearing area and bearing capacity.

Turbocharging system

The turbochargers are located at the forward end of the engine. The 8- and 16-cylinder versions are equipped with units working on the multi-pulse principle, offering the advantages of both constant pressure and pulse turbocharging. The 12-cylinder model features turbochargers operating on the 3-pulse principle. The turbochargers can be adapted for supplementary air boost in cases where rapid take-up of loads is required. Water cleaning arrangements are incorporated on compressor and turbine sides as well as charge air cooler cleaning can be carried out during engine operation.

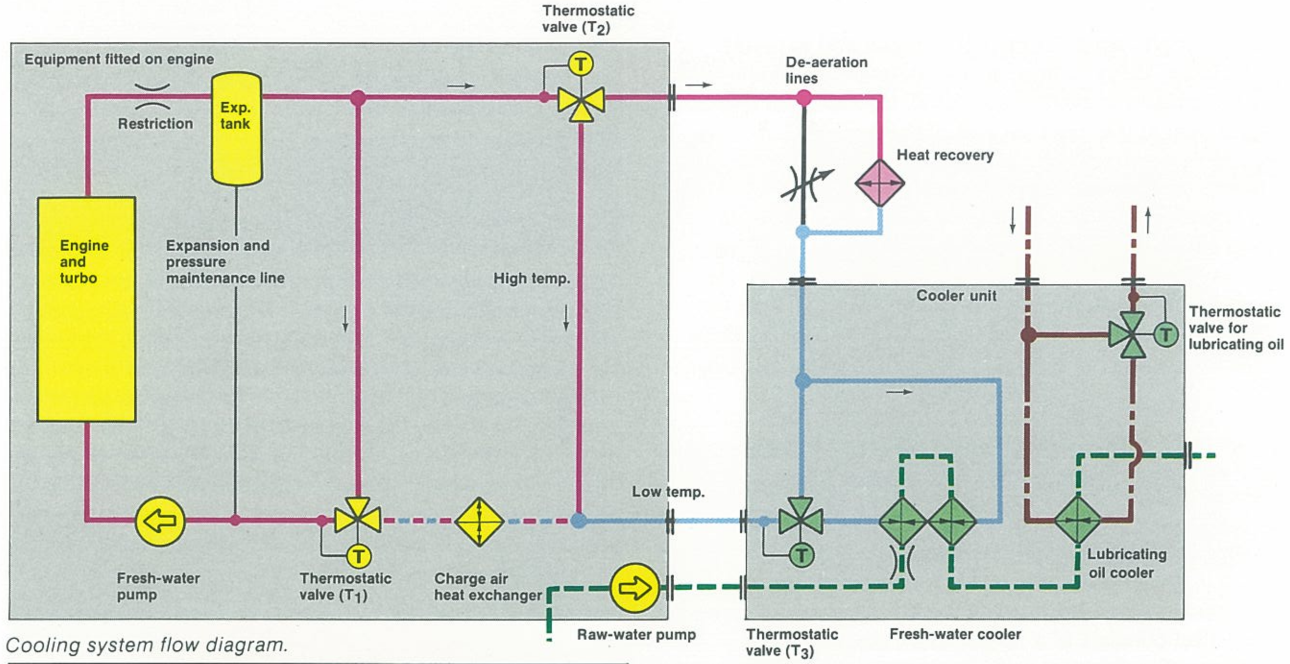


Forward-end turbo arrangement.

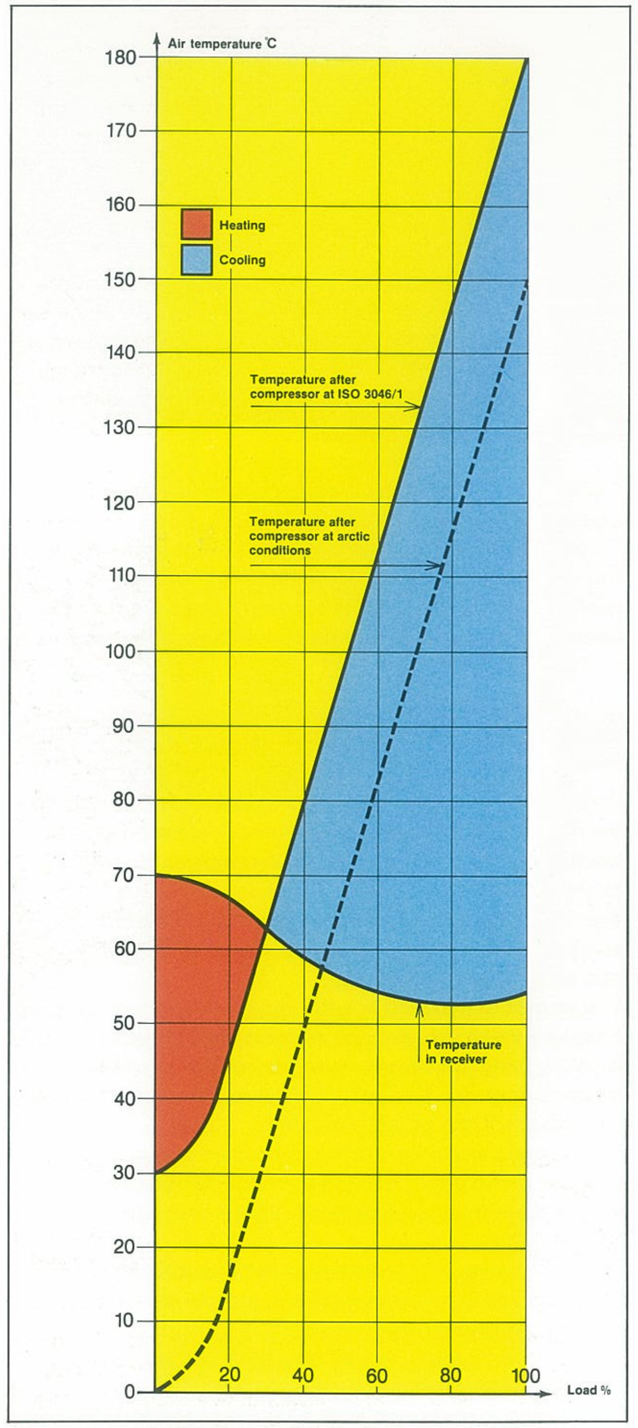
Equipment for measuring the turbocharger speeds is included as standard.
To allow efficient handling of the exhaust assemblies, the exhaust pipes are composed of non-insulated unit sections and are externally clad with easily-removable laminated and insulated plates, resulting in low external surface temperatures.

Fuel injection system

In order to eliminate secondary injection and cavitation the injection pumps are fitted with constant pressure valves; this helps to keep fuel consumption down and to give smoke-free operation.
The heavy fuel-version is equipped with flowthrough pumps which allow starting and stopping on heavy fuel and also prevent gas locks.
The pumps are pressure lubricated and this functions as a seal between the plunger and the liner. This function is particularly important when pumps are kept heated in stopped engines. The pressure lubrication assists in lubrication of the pump elements.
The nozzles are temperature-controlled and a heatexchanger is included in the system to maintain correct temperature in all operating situations and when starting on heavy fuel.
The high pressure pipe between the pump and the nozzle has improved fatigue strength and is fitted with vibration-absorbing connectors.
The injection system is well enclosed behind removable heat-insulated covers.
The engine is equipped with a starting regulator to limit fuel at start-up.



Cooling system flow diagram.



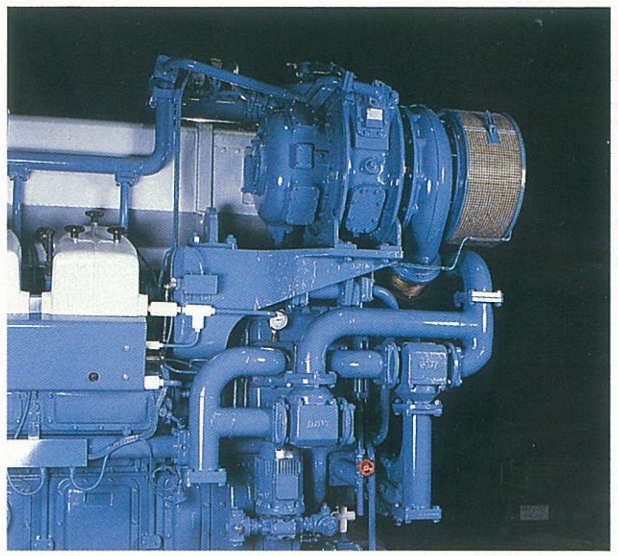
Charge air temperature control diagram.

Cooling system

The F30 engine is equipped with a built-on fresh-water cooling system, which consists of two integrated circuits; one is a high-temperature circuit for cooling the cylinder block, the cylinder heads and the turbocharger, and the other controls the temperature of the charge air, (see diagram). The cooling system has been designed to give optimum combustion especially when running on heavy fuel and to avoid cold corrosion. when running at reduced loads. At low loads the temperature regulator T_2 gives increased water temperature in the air cooler and cylinder jackets, and this also pre-heats the charge air. At high loads the temperature regulators T_1 and T_3 give vigorous cooling of the cylinder jackets and charge air (see diagram).

Since the engine is fitted with this type of cooling system, and the cooler unit is fitted with a thermostatic valve which keeps the inlet temperature constant, it is possible to utilize the high-temperature water from the engine very efficiently, with low installation costs.

Thus, it is possible to recover as much as 25% of the energy supplied to the engine as fuel, by utilizing the high-temperature water at 75° C (cooling it down to about 40° C) for fresh water generation, tank heating, general accommodation heating, preheating of steam boiler feed water, etc.

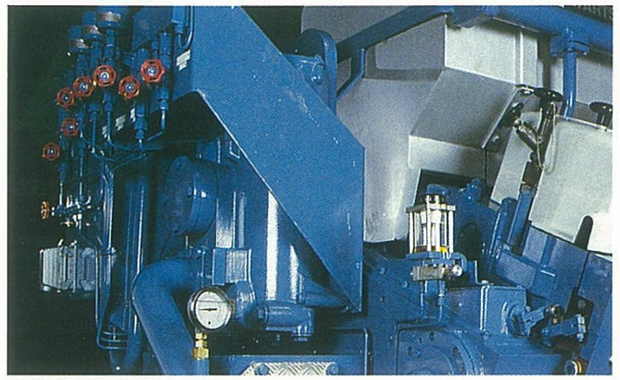


Piping arrangements - cooling system.

A unique system which ensures that the temperature of the cooling water and charge air in the engine is kept within specified limits, under all load conditions, and that the excess heat can be utilized.
The system is patented.

Lubricating system

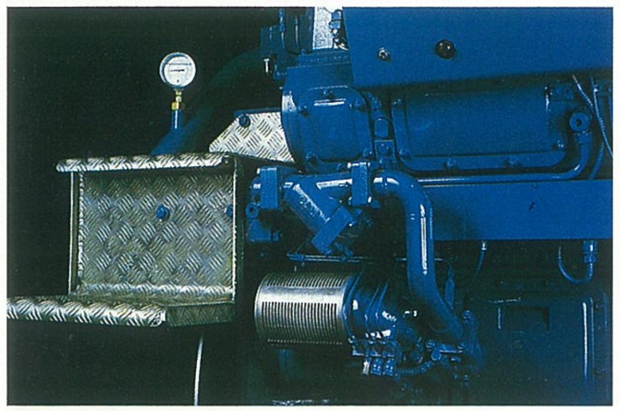
The F30 engine is fitted with a direct-driven lubricating oil pump of gear type. It distributes lubricating oil via an oilway system to bearings, pistons, valve mechanisms etc. Return oil is collected in the engine oil sump which is either of the wet or dry type. The wet sump contains the entire oil quantity and serves as a reservoir for the system. The dry sump, which is considerably smaller, has drainage openings in its base which are directly connected to a separate collecting tank for the lubricating oil.



Main lubricating oil filter.

The pressure of the lubricating oil is maintained at a constant level by means of a built-in regulator unit. An electrically-operated pump pre-lubricates the engine before starting. The engine has a permanently mounted filter unit which comprises a double full-flow filter in the oil inlet pipe and side filters of centrifugal type in the bypass lines to the crankcase. The full-flow filter has a visual pressure indicator which gives warning of any pressure drop due to contamination. Pressure drop is also registered at the engine control panel.

Starting and operating system



Starter motor assembly

The F30 engine is started and stopped by means of an electro-pneumatic control system which operates fully automatically in response to signals from control devices and safety monitors. The system includes an air-driven starter motor with pre-engaged pinion, so that 100% torque is only obtained with full gear engagement. The compressed air is pressure reduced and guided to the starter motor by means of a pressure control block on the engine.

Regulating system

The engine is fitted with either mechanical-hydraulic or electronic speed regulation. The mechanical-hydraulic governor is driven by a bevel gear on the camshaft. The electronic governor system actuator is either fully electric without any mechanical drive, or electric with mechanical drive. The input signal to this system is provided by an electromagnetic pickup. Both governor systems are mechanically linked to the injection pump control rods.

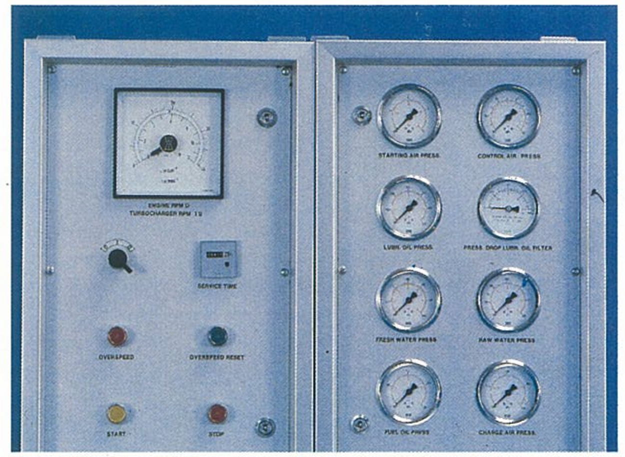
Control cabinet and panel

The control cabinet is mounted on the operating side of the rear end of the cylinder block. It contains the pneumatic valves and the electrical connections for the engine.

The pneumatic valves are built on to a block which has internal connections, and is connected to the pneumatic cylinders, giving stop/emergency stop and start fuel limit, and also to the valve block to control the starter motor. The control cabinet contains electrical terminal blocks for the various sensors fitted to the engine, and connectors for coupling to the control panel. Space is also provided for connection of extra sensors, amplifiers, pyrometer equipment etc.

The sensors for the electronic tachometer are connected into the control cabinet.

The control panel, which is intended to be fitted to the side of the engine, is in two sections. One section carries eight panel-mounted pressure gauges for measuring air and fluid pressures. These are connected to the engine terminal block. The other section of the control panel carries the following electrical/electronic controls for monitoring and operating the engine:



The control panel.

- ☐ Start/stop push buttons for electrical signals to control cabinet and for internal functions such as start fuel limiting, operational time meter etc.
- ☐ Indicator and reset button for overspeed protection system.
- ☐ Tachometer with double analogues scales and switch for selection of engine speed or turbocharger speed.
- ☐ Electrical operational time meter (shows real time.).
- ☐ Electronic tachometer with four "trip points", for overspeed, start sequence, connection and disconnection of alarm system; also an adjustable auxiliary function (for example, interlock on clutch engagement, excitation of generator).

WÄRTSILÄ NOHAB F30 – generating sets

Main technical data

Speed	720–750 r/min.	825 r/min.	900 r/min.	1000 r/min.
BMEP at max. continuous rated power	1,87 MPa (18,7 bar)	1,87 MPa (18,7 bar)	1,87 MPa (18,7 bar)	1.70 MPa (17.0 bar)
Mean piston speed	7.2–7.5 m/s	8.3 m/s	9.0 m/s	10.0 m/s
Specific fuel consumption per kWh (BHPh) 1)				
1/1 load	190 g (140 g)	192 g (141 g)	196 g (144 g)	201 g (148 g)
3/4 load	188 g (138 g)	190 g (140 g)	195 g (143 g)	198 g (145 g)
1/2 load	190 g (140 g)	192 g (141 g)	198 g (145 g)	203 g (149 g)
Specific lubricating oil consumption per kWh (BHPh) at 1/1 load	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)

1) According to ISO 3046/1 and the use of a fuel oil with a calorific value of at least 42,700 kJ/kg and without engine driven pumps for water and lubricant

Rated power F30A

for operation on distillate fuel.

		Max. continuous rated power 1), 2), 3)									Int. rated power 4)		
		720 r/min.—60 Hz			750 r/min.—50 Hz			900 r/min.—60 Hz			1000 r/min.—50 Hz		
Engine designation	No. of cyl.	Engine kW	Generator kW)	Generator kVA)	Engine kW	Generator kW)	Generator kVA)	Engine kW	Generator kW)	Generator kVA)	Engine kW	Generator kW)	Generator kVA)
F38A	8	1320	1250	1570	1380	1310	1640	1660	1590	1990	1670	1600	2000
F312A	12	1980	1880	2350	2070	1970	2460	2480	2380	2980	2500	2400	3000
F316A	16	2650	2520	3150	2760	2620	3280	3310	3180	3970	3340	3210	4010

Rated power F30B

for operation on heavy fuel 180 cSt/50° C (1500 s.R1/100° F).

		Max. continuous rated power 1), 2), 3)								
		720 r/min. —60 Hz			750 r/min. —50 Hz			900 r/min. —60 Hz		
Engine designation	No. of cyl.	Engine kW (BHP)	Generator kW)	Generator kVA)	Engine kW (BHP)	Generator kW)	Generator kVA)	Engine kW (BHP)	Generator kW)	Generator kVA)
F38B	8	1200 (1630)	1140	1430	1250 (1700)	1190	1490	1500 (2040)	1440	1800
F312B	12	1800 (2450)	1710	2140	1870 (2540)	1780	2220	2250 (3060)	2160	2700
F316B	16	2400 (3260)	2280	2850	2500 (3400)	2380	2970	3000 (4080)	2880	3600

1) Engine powers according to ISO 3046/1 (Pr = 100 kPA, Tr = 300 K, Tcr = 300 K, ∅ = 60%). Marine generating set engines also meet the conditions required by the classification societies of max. 45° C ambient temperature and 32° C sea water temperature. DIN 6270, BS 649, SAE 816b and DEMA are also accepted.

2) 10% overload available for 1 h in each 12 h.

3) Based on a generator efficiency of 95-96% and PF 0,8.

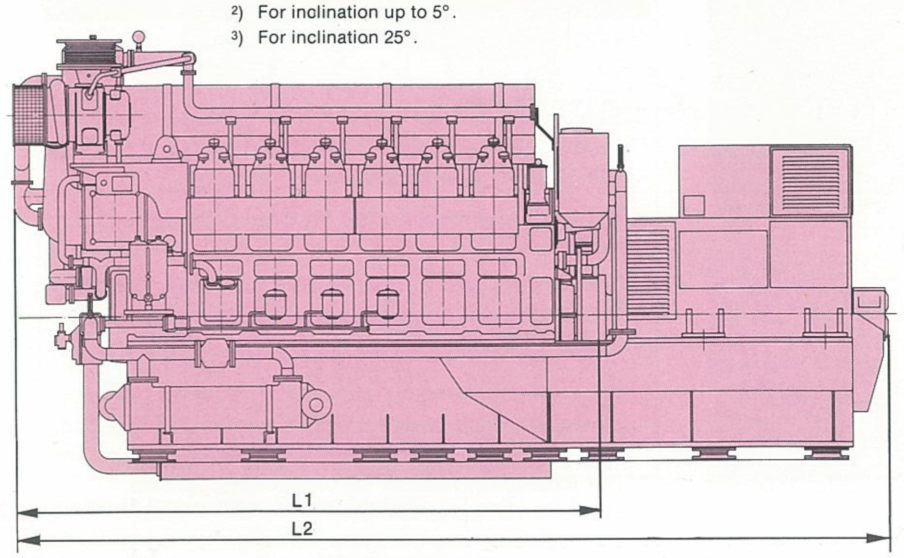
4) No overload available. To be used for emergency and standby purposes.

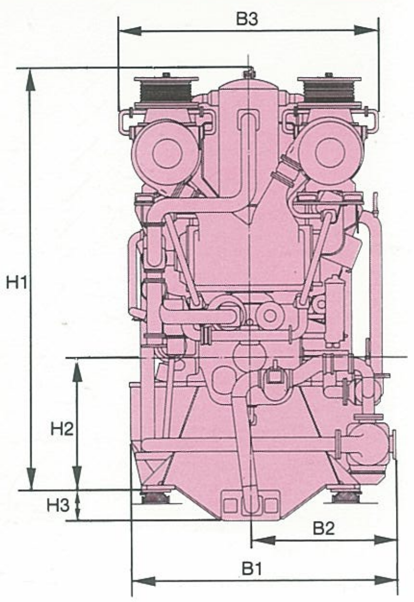
The above outputs are valid for distillate fuel and heavy fuel according to Wärtsilä Diesel Fuel Specification No. 91 939 098 00E

Generating set dimensions and weights

	Weight tons 1)			Dimensions 1)								
Engine type	No. of cyl.	Total gen.set	Generator (included)	B1 mm	B2 mm	B3 mm	H1 mm	H2 mm	H3 2) mm	H3 3) mm	L1 mm	L2 1) mm
F 38	8	23	7.6	1920	1040	1730	3100	1000	0	425	3340	5460
F 312	12	32	9.8	2050	1100	1950	3120	1000	0	425	4420	6620
F 316	16	41	13	2050	1100	1980	3120	1000	0	425	5325	8065

1) Lenghts and weights vary due to make and type of generator.
2) For inclination up to 5°.
3) For inclination 25°.





WÄRTSILÄ NOHAB F30 – propulsion engines

Main technical data

Speed	720 r/min.	750 r/min.	825 r/min.	900 r/min.
BMEP at max. continuous rated power	1,87 MPa (18,7 bar)	1,87 MPa (18,7 bar)	1,87 MPa (18,7 bar)	1,87-1,70 MPa (18,7-17,0 bar)
Mean piston speed	7.2 m/s	7.5 m/s	8.3 m/s	9.0 m/s
Specific fuel consumption per kWh (BHPh) 1)				
1/1 load	190 g (140 g)	190 g (140 g)	192 g (141 g)	196 g (144 g)
3/4 load	188 g (138 g)	188 g (138 g)	190 g (140 g)	195 g (143 g)
1/2 load	190 g (140 g)	190 g (140 g)	192 g (141 g)	198 g (145 g)
Specific lubricating oil consumption per kWh (BHPh) at 1/1 load	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)	Approx. 1.5 g (1.0 g)

1) According to ISO 3046/1 and the use of a fuel oil with a calorific value of a least 42,700 kJ/kg and without engine driven pumps for water and lubricant.

Rated power F30A

for operation on marine diesel fuel.

		Max. continuous rated pover 1), 2)			
Engine designation	No. of cyl.	720 r/min. kW (BHP)	750 r/min. kW (BHP)	825 r/min. kW (BHP)	900 r/min. kW (BHP)
F38A	8	1320 (1800)	1380 (1880)	1520 (2060)	1660 (2250)
F312A	12	1980 (2700)	2070 (2810)	2270 (3090)	2480 (3380)
F316A	16	2650 (3600)	2760 (3750)	3030 (4120)	3310 (4500)

Rated power F30B

for operation on heavy fuel 180 cSt/50° C (1500 s.R1/100° F).

		Max. continuous rated power 1), 2) (Fuel stop power)			
Engine designation	No. of cyl.	720 r/min. kW (BHP)	750 r/min. kW(BHP)	825 r/min. kW (BHP)	900 r/min. kW (BHP)
F38B	8	1200 (1630)	1250 (1700)	1370 (1860)	1500 (2040)
F312B	12	1800 (2450)	1870 (2540)	2060 (2800)	2250 (3060)
F316B	16	2400 (3260)	2500 (3400)	2750 (3740)	3000 (4080)

1) Engine powers according to ISO 3046/1 (Pr = 100 kPA, Tr = 300 K, Tcr = 300 K, ∅ = 60%). The conditions required by the classification societies of max. 45° C ambient temperature and 32° C sea water temperature. DIN 6270, BS 649, SAE 816b and DEMA are also accepted.

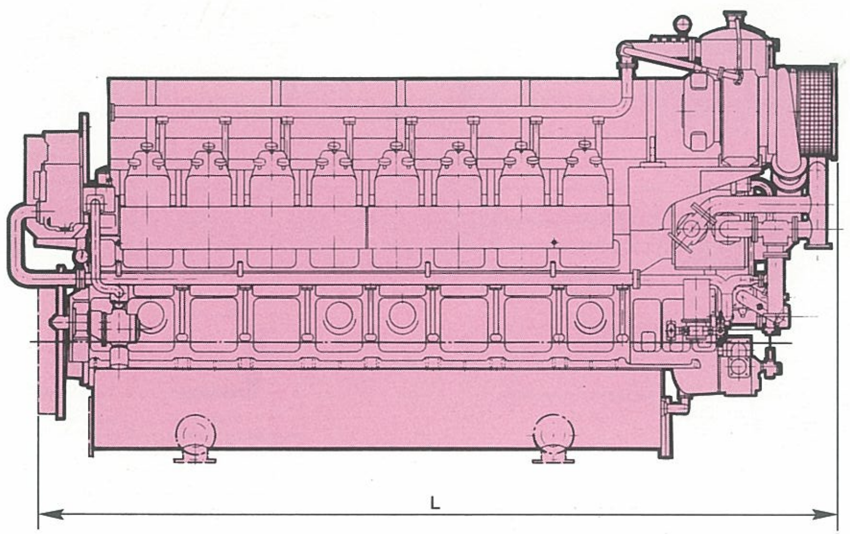
2) Overload not allowed during operation. 10% overload during workshop test only.

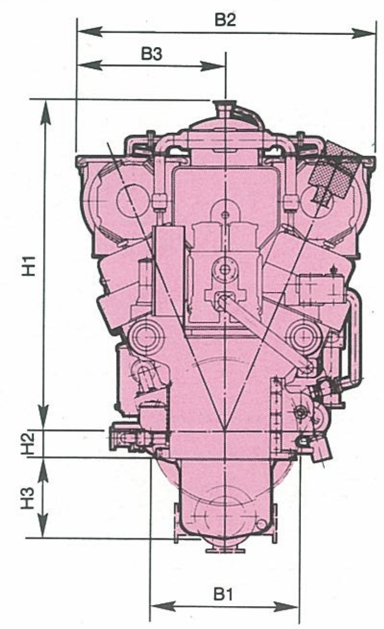
The above outputs are valid for marine diesel fuel and heavy fuel according to Wärtsilä Diesel Fuel Specification No. 91 939 098 00E

Engine dimensions and weights

Engine type	Weight engine with flywheel tons 1)	L mm	B1 mm	B2 mm	B3 mm	H1 mm	H2 mm	H3 mm
F38	12.0	3340	920	1730	850	2100	180	540
F312	17.2	4420	920	1950	975	2120	180	540
F316	21.7	5325	920	1980	990	2120	180	540

1) Weight of flywheel abt. 1000 kg.





F30 unit philosophy – for simple installation and economical operation

Start/control system

A complete system for starting and stopping the engine control, monitoring and safety.

Connections for all standard sensor units and other electrical equipment.

Documentation: In accordance with applicable IEC*) and CETOP*) standards.

Fuel system—exhaust system

The system is of recirculated type with closed connections. Connection required only to the fuel tank. if eŋ/ For blended fuel operation an alternative system with a fueltreatment unit and nozzle cooling unit is used.

To further improve fuel economy exhaust boiler is recommended. Up to 20% of the engine fuel consumption energy is available for heating purposes, (at 180° C).

Cooling system

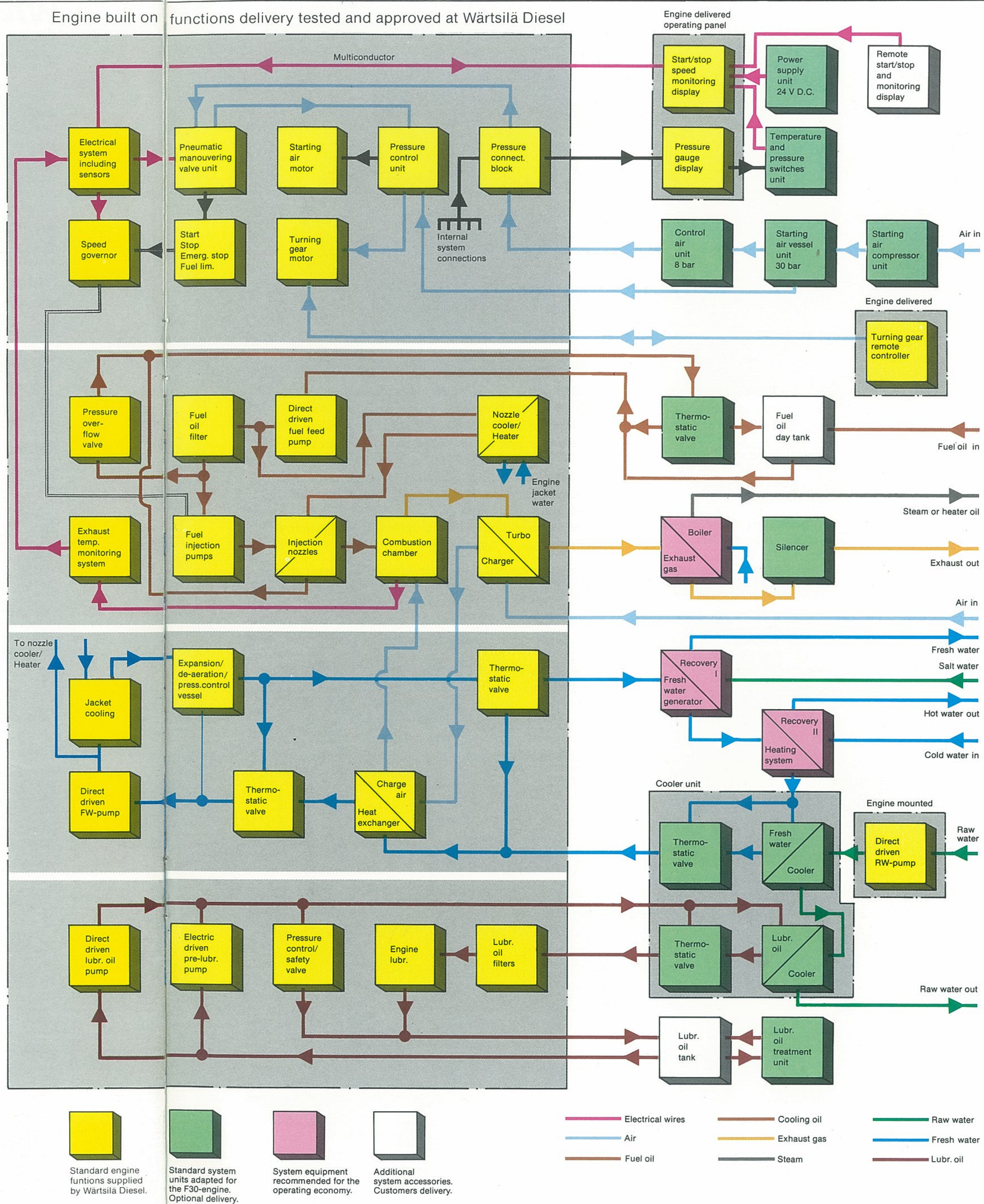
The F30 integrated fresh water cooling system dissipates the total heat losses of jacket and charge air cooling at high temperature level. (70—75° C).

Up to 25% of the engine fuel consumption energy is available for recovery, from the cooling system (if utilized down to 40° C).

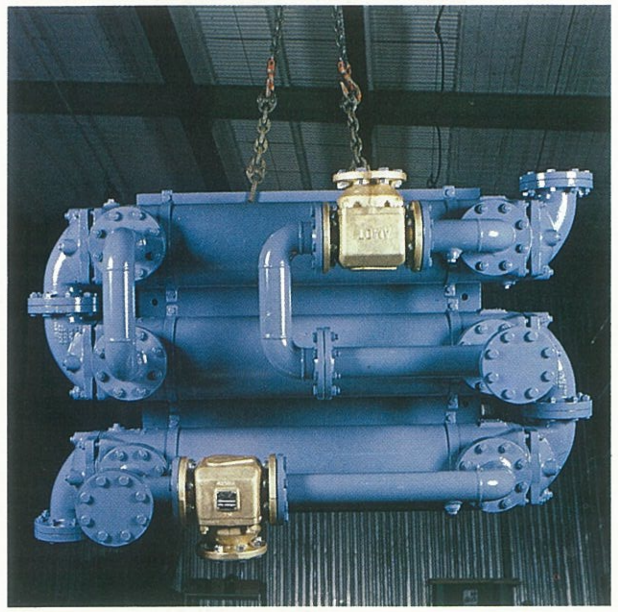
Lubricating system

A complete system with built-on filters, pumps and pressure control equipment. Only needs connection to the cooler unit, and lubricating oil tank, if energy dry sump is fitted.

*) IEC = International Electronical Commission.
CETOP = Comité Européen des Transmissions Oleohydrauliques et Pneumatiques.



Cooler unit

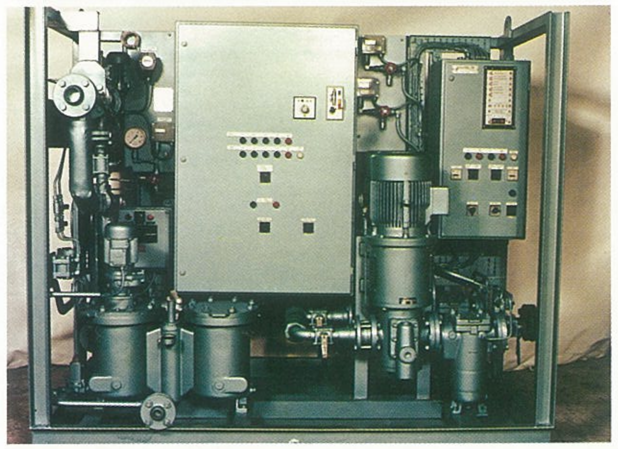


The cooler unit consists of three separate and identical coolers with two self-acting thermostatic valves mounted into a single compact unit.

It has two connections for raw water, two for fresh water and two for lubricating oil. The unit can be mounted in all positions which makes it easy to install.

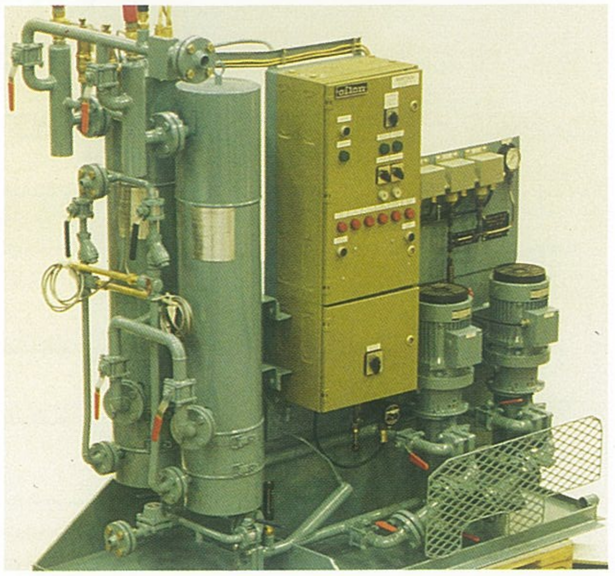
A further advantage of this unit is that only one cooler is required as spare part for each of the three coolers.

Heavy fuel system unit



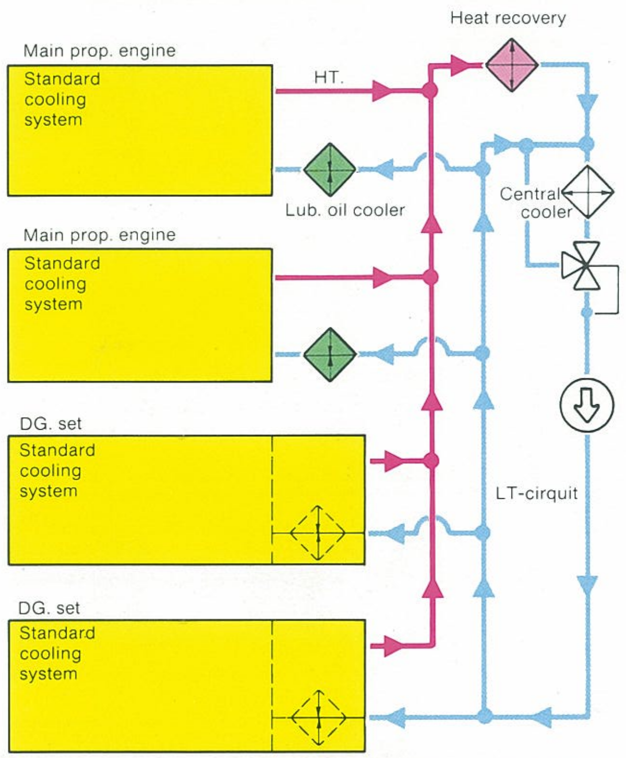
The fuel system includes electrically-driven feed pumps and automatic self-cleaning fuel filters.
The fuel heater, which uses electrical power, steam or hot oil as heat source, is controlled by a viscosimetric device.
In order to eliminate the risks of rapid temperature variation in the fuel supplied to the injection pumps, when changing over from heavy fuel to distillate fuel, or vice versa, a return system is fitted. In this, fuel returned from the engine is led back to the suction side of the feed pumps, through a mixing/de-gassing tank.
To facilitate installations, and to reduce the number of pipes required and the consequent installation costs, the fuel treatment unit is complete consisting of feed pumps, fuel heater, fuel filter and viscosimetric controller.
This unit is supplied ready for UMS/EO classification, fitted with a control cabinet for automatic starting of feed pumps, control equipment for the electric heater, and complete monitoring equipment for temperature, pressure and viscosity.

Nozzle temp. control system unit



The nozzle temp. control system is a complete unit for simple and economical fitting on board ship. The system consists of an oil tank, circulation pumps, magnetic filter and heat exchanger. The unit can be supplied ready for UMS/EO classification, fitted with control cabinet for automatic starting of the circulation pumps, and complete pressure, temperature and tank level monitoring equipment.
The cooling heating medium should be a temperature-stable hydraulic or lubricating oil.

Central cooling system

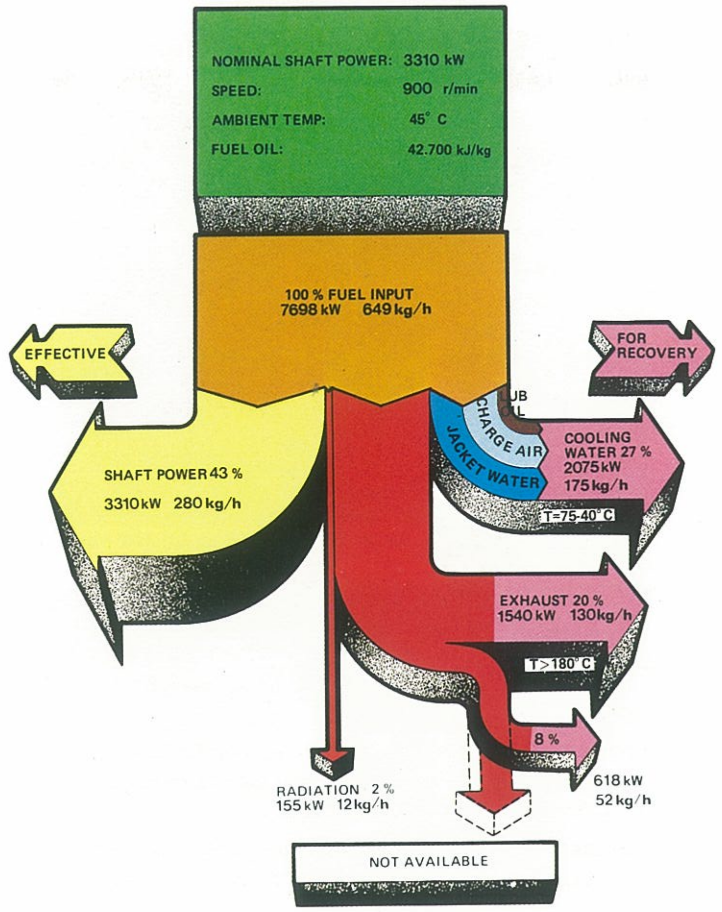


In multi-engine installations, the cooling system of this engine offers the unique advantage that only connections to inlet and outlet are required.
Only a low-temperature circuit, with a maximum temperature of 39° C, is required in the external system. The high-temperature circuit is located entirely within the engine. High-temperature water from all the engines can be collected in a common return pipe for recovery of heat energy.

Fuel economy

- Fuel economy is a question of utilizing the total fuel input energy.
- Low fuel consumption — high efficiency and possibility of burning low quality fuel is one part of the question.
- The heat loss from the integrated cooling system will reject up to 27% of the fuel input energy at 75° C for recovery.
- The heat loss from exhausts and cooling system can be utilized for fresh water generating, heating of compartments, tank heating etc.
- Especially on platforms there are large energy requirements where all the heat losses from the DG-sets can be used.

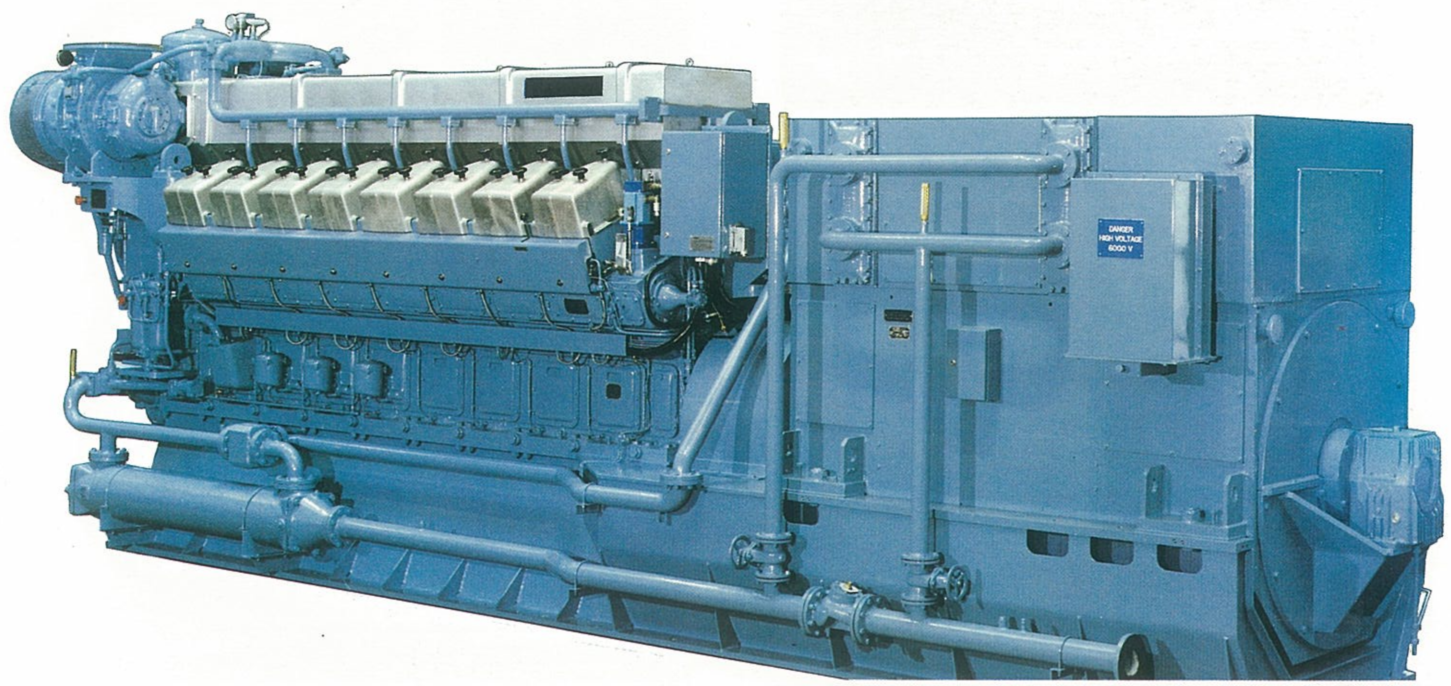
ENERGY BALANCE F316 ENGINE



Power packs

The standard Wärtsilä Nohab F30 power pack consists of a diesel engine and a generator mounted on a common base frame, which also contains the complete oil supply equipment. The necessary installation equipment, such as coolers for water and lubricating oil, filters, valves, oil priming pump and complete pipe systems are mounted on the unit.

The power pack is thus self-contained and has very few connections to external systems, e.g. only two connections to the cooling water system.
The power pack design with built-on systems is also the optimum solution when the F30 engine is used for direct drive of other equipment, such as pumps, bow thrusters, etc.



Power pack, type Wärtsilä Nohab F316, with water-cooled, high-voltage generator.

WÄRTSILÄ NOHAB F-type engines operating all over the world

AL WADJH power plant, Saudi Arabia, with four 2,5 MW diesel generating sets.

FORSMARK nuclear power station, Sweden, with four 3 MW diesel generating sets.

COSTA RIVIERA, cruiser of Italy, with three 2,7 MW diesel generating sets.

LEONARD J. COWLEY, fisheries patrol vessel, Canada, powered by two 2 MW main engines.

DHAID power plant, U.A.E., with five 1,5 MW diesel generating sets.

TREASURE SCOUT drilling rig, Norway, with four 2,3 MW diesel generating sets.

SINDHU, one of eight Indian supply vessels, each with two 2 MW main engines.

ASTRID MARIE: Swedish fishing vessel.

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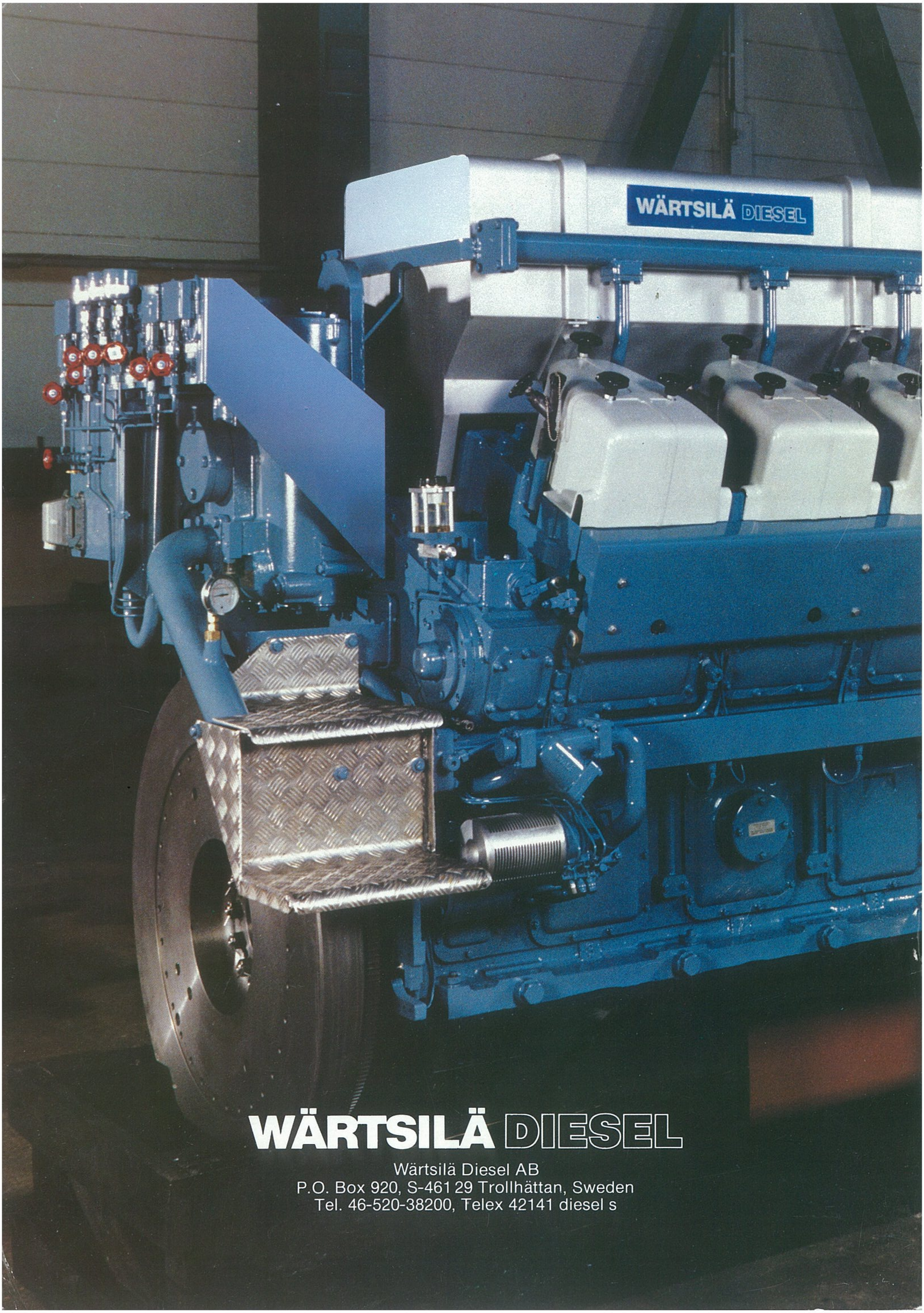
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