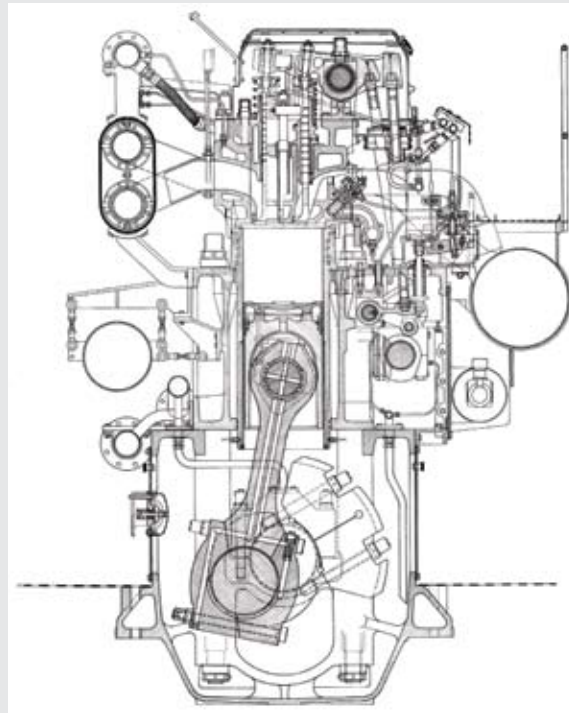


TM410

2200-11160 kW at 500-600 min⁻¹

TOTAL SERVICE



WÄRTSILÄ ENGINES

CHARACTERISTICS

- Medium speed (water cooled) 6-, 8- and 9-cylinder in-line engines, 12-, 16-, 18- and 20-cylinder 40° V-engines.
- Four stroke, direct fuel injection.
- Cylinder head with two exhaust valves and one or two inlet valves.
- Uni-directional or directly reversible engine.
- Designed for operation on heavy fuel with specifications meeting ISO 8217:2005(E), ISO-F-RMH 700.

BENEFITS

- Proven design.
- Low wear and long component life.
- Total engine output can be taken off at either end.
- Reliable.



ENGINE DESCRIPTION

Bed plate	Rigid U-shape bed plate which is made of laminar or nodular cast iron.
Cylinder block	The cylinder block is made of cast iron, incorporating the camshaft casing and individual cylinder water jackets. Bed plate and cylinder block are connected by tie bolts.
Crankshaft	The crankshaft is a one piece forging with counterweights fitted on each crank web.
Torsional vibration damper	A torsional vibration damper is fitted at the free end of the engine, if required.
Cylinder liner	The cylinder liner is made of pearlitic cast iron. The collar is equipped with bores to cool the upper liner part.
Connecting rod	The old type connecting rods are made of high-tensile steel forging. The big end has three serrated joints, enabling easy removal of the bearing caps along a horizontal slide. The latest design connecting rod is the 'marine head' type.
Piston	One-piece and two-piece piston types have been applied. The one-piece pistons are made of a light alloy. The two-piece pistons consist of a light alloy skirt and a steel piston crown. The piston has 4, 5 or 6 piston rings, which depends on the engine configuration and the used piston type.
Cylinder head	The cylinder head is made of pearlitic cast iron, with double bottom in order to withstand high thermal and mechanical loads. The cylinder head is provided with two exhaust valves in cooled exhaust valve cages, one large inlet valve (TM410-A) or two inlet valves (TM410-B, C and D). It also accommodates a fuel injector and a starting valve. Rotocaps can be fitted on the exhaust valves, if needed.
Camshaft	The camshaft with hardened steel cams is gear driven. The cams are hydraulically shrunk on the shaft. The directly reversible engine is provided with double cams with a hydraulic reversing gear, which moves the camshaft in the axial direction.
Injection pump	Each cylinder has an individual high-pressure fuel pump.
Governor	The engine has a governor of the hydraulic type with pneumatic or electric speed setting device.
Fuel system	The fuel system consists basically out of high-pressure fuel pumps, protected or double-walled high-pressure fuel lines and fuel injectors with water-cooled nozzle tips.
Lubricating oil system	One lubricating oil system for bearing lubrication and piston cooling. Separate lubricating oil system for cylinder liners and overhead valve gear. Dry sump, engine driven pumps, lubricating oil filter and lubricating oil cooler.
Starting system	The engine is started by compressed air led to the starting air valve on each cylinder of an in-line engine or to the cylinders of one bank of a V-engine. Marine engines have starting air valves on both banks.
Cooling system	The cooling water system is designed for fresh (treated) cooling water and comprises a low temperature (LT) circuit and a high temperature (HT) circuit. Two stage charge air cooler. Separate water cooling system for injector nozzles.
Exhaust gas system	Pulse or compact exhaust gas system.
Charge air system	The engine is equipped with a two stage charge air cooler consisting of a HT- and LT-water section.
Turbocharging	The turbocharger(s) can be located at flywheel side, free end or both sides.
Safety equipment	The majority of the engines has a mechanical/pneumatic overspeed system. Some engines have an electronic/pneumatic overspeed system, by using an electronic safety module (ESM 10).
Classification	By all established classification societies.
EIAPP	The engine can be issued with an EIAPP certificate if it complies with the NO _x Technical Code according IMO regulations MARPOL 73/78 - annex VI.

TECHNICAL DATA

TECHNICAL DATA								
Engine type		6TM410	8TM410	9TM410	12TM410	16TM410	18TM410	20TM410
Model		in-line	in-line	in-line	40° V	40° V	40° V	40° V
Number of cylinders		6	8	9	12	16	18	20
Bore / stroke	mm	410 / 470	410 / 470	410 / 470	410 / 470	410 / 470	410 / 470	410 / 470
Displacement	l	372	496	558	744	992	1116	1240
Direction of rotation		Clockwise or counter-clockwise						
Maximum power ratings								
Engine speed	min ⁻¹	500-600	500-600	500-600	500-600	500-600	500-600	530
Engine output (MCR ¹⁾)	kW	2200-3720	2940-4960	3300-5580	4400-7440	5880-9920	6600-11160	8832
Mean effective pressure	bar	14.2-20.0	14.2-20.0	14.2-20.0	14.2-20.0	14.2-20.0	14.2-20.0	17.9
Mean piston speed	m/s	7.8-9.4	7.8-9.4	7.8-9.4	7.8-9.4	7.8-9.4	7.8-9.4	8.3
Specific fuel consumption ²⁾								
at 100% load	g/kWh	183-210	184-212	183-210	183-210	184-212	183-210	212
at 75 % load	g/kWh	184-207	185-208	184-207	184-207	185-208	184-207	208
Lubricating oil consumption ³⁾	l/h	4.5	6.0	6.8	9.0	12.0	13.5	15.0
Idling speed	min ⁻¹	200	200	200	200	200	200	200

1) Maximum Continuous Rating.

2) According to ISO 3046/1, lower calorific value 42,700 kJ/kg, at nominal engine speed. Tolerance +5%.

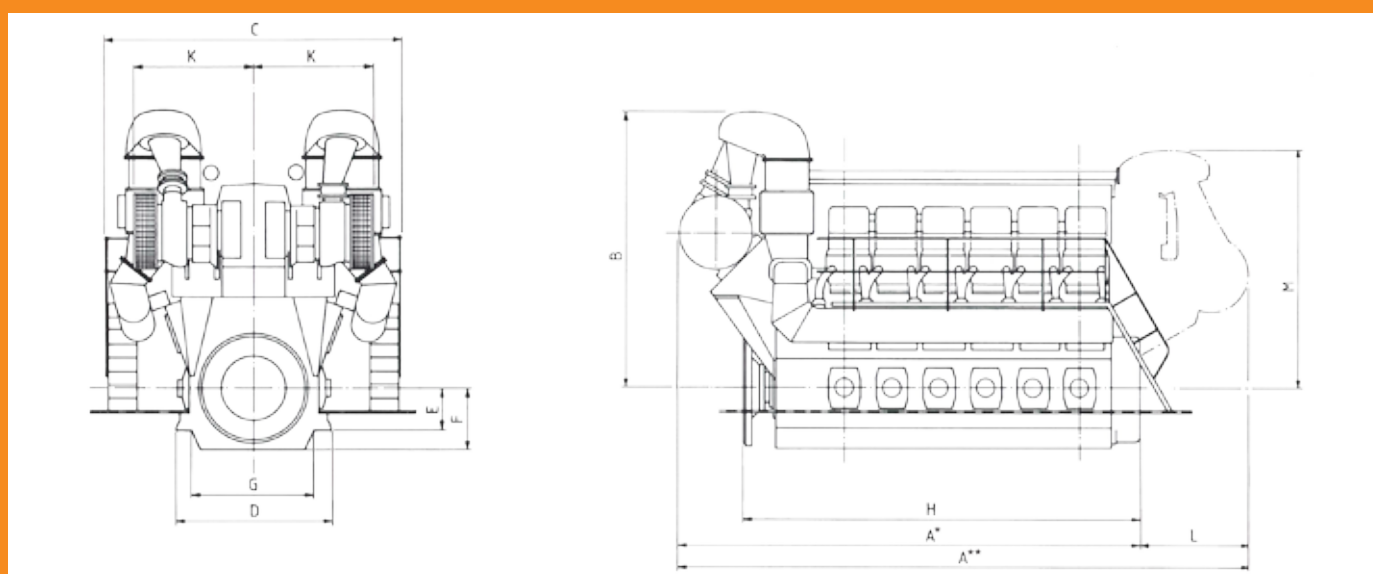
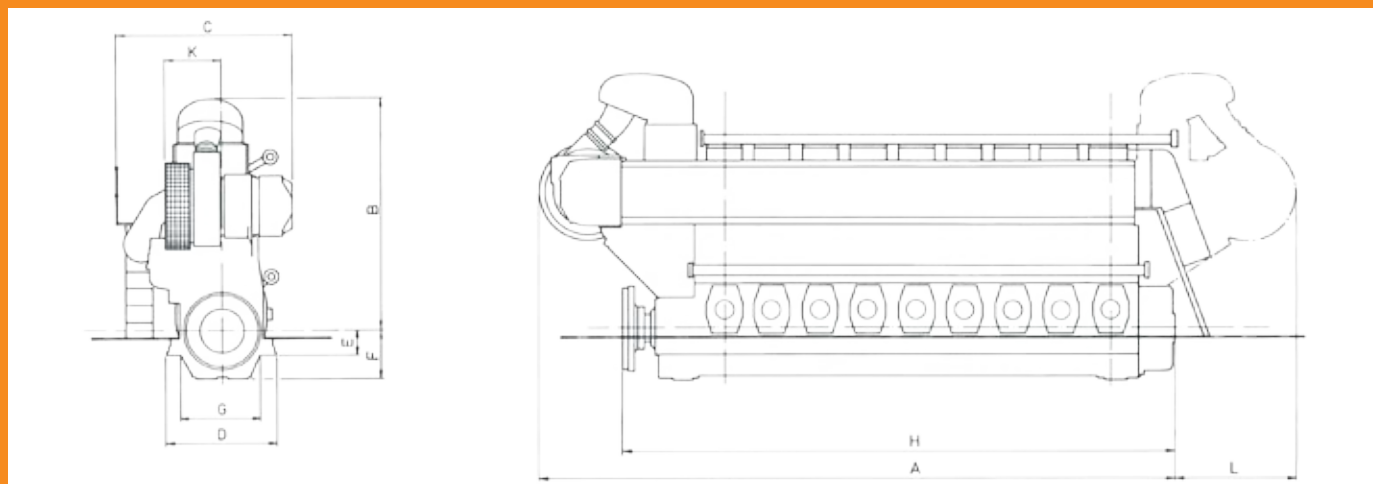
3) Lubricating oil consumption at 100% load. Tolerance approximately 25%.

Note:

The values given in this document are for information purposes only and not binding.



DIMENSIONS



PRINCIPAL ENGINE DIMENSIONS (mm) AND WEIGHTS (t)

Engine type	A*	A**	B	C	D	E	F	G	H	K*	K**	L	M	Weight
6TM410	6863	-	3760	2730	1760	410	750	1280	5905	610	-	1463	-	61
8TM410	8540	-	3760	2730	1760	410	750	1280	7305	980	-	1740	-	78
9TM410	9240	-	3760	2730	1760	410	750	1280	8005	980	-	1740	-	88
12TM410	6980	-	4045	4400	2320	620	875	1840	5965	1740	-	1480	3475	98
16TM410	8650	10404	4045	4400	2320	620	875	1840	7365	2110	1775	1752	3475	130
18TM410	9350	11100	4045	4400	2320	620	875	1840	8065	2110	1775	1752	3475	140
20TM410	-	11000	3153	4400	2320	620	875	1840	8690	-	-	1478	3153	155

* Turbocharger(s) installed at one side of the engine. ** One turbocharger at each side of the engine.

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