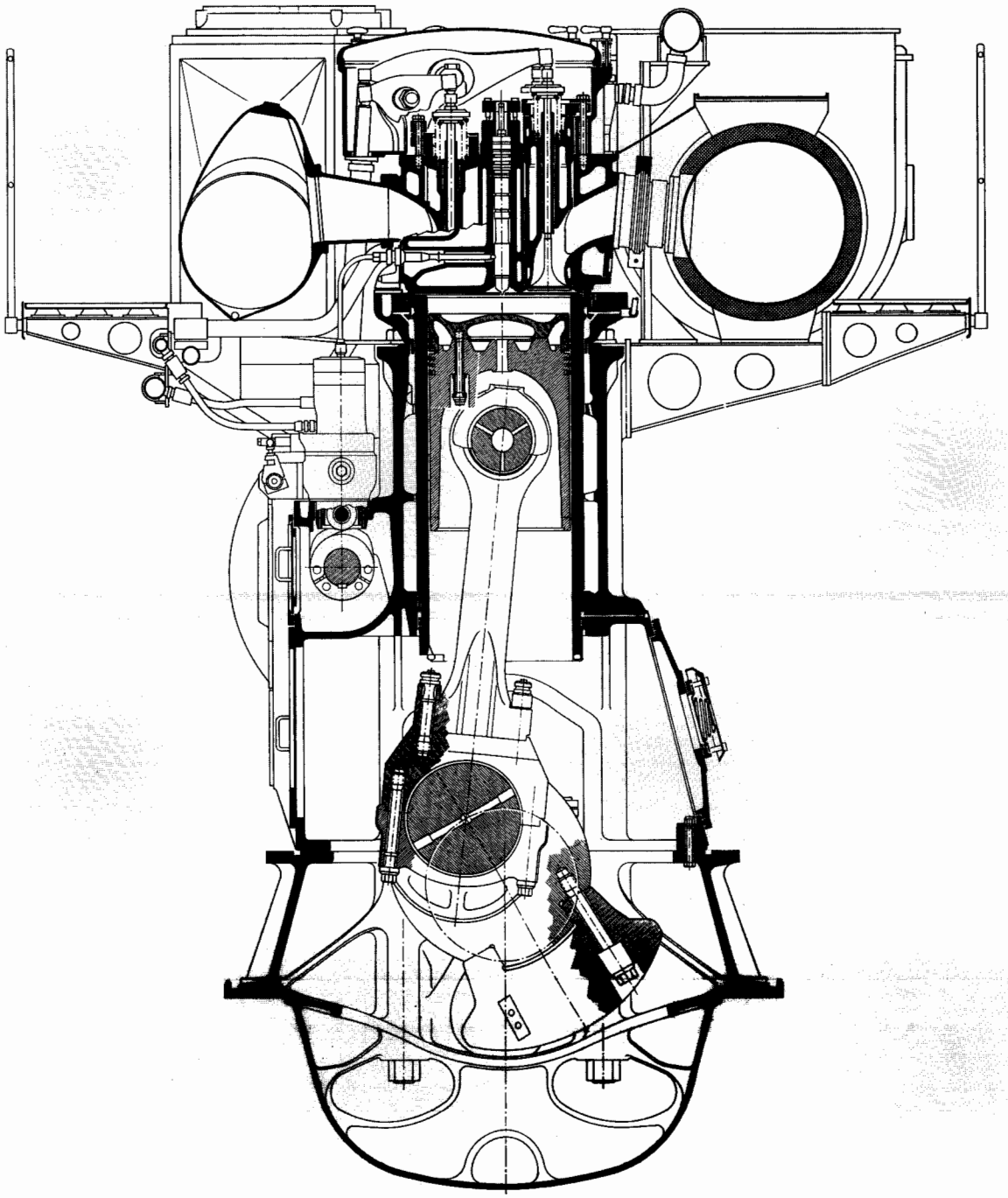
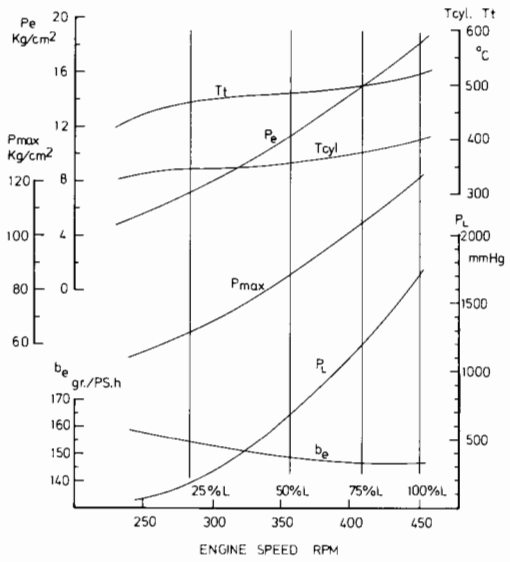
KAWASAKI
HEAVY INDUSTRIES, LTD.

KAWASAKI-M·A·N
4-STROKE DIESEL ENGINE
L52/55A



PERFORMANCE CURVE



Tt : Exhaust gas temperature at turbine inlet

Tcyl : Exhaust gas temperature at cylinder outlet

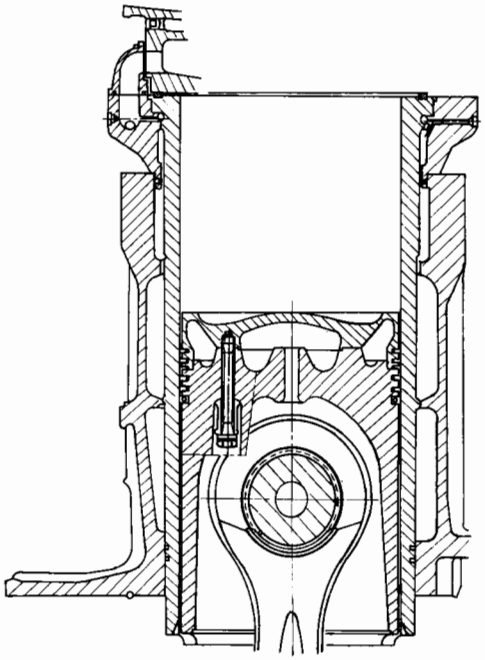
Pmax : Maximum combustion pressure

PL : Charge air pressure

Pe : Brake mean effective pressure

be : Specific fuel consumption

PISTON AND CYLINDER LINER



APPLICATION

Marine propulsion engines
Stationary installations

The engine is a single-acting four-stroke unit of trunk piston design. Its constant pressure turbo-charging system makes this design an extremely economical proposition due to its particularly low fuel consumption.

Bedplate

The bedplate is a mono-block casting. It carries the crankshaft and simultaneously serves as a lubricating oil tray. As the amount of lubricating oil required for long service periods exceeds the capacity of the bedplate, a service tank is provided.

Engine frame

The engine frame is a mono-block casting. The sidewalls incorporate large openings closed off by covers giving ready access to running gear and bearings. Some of these covers are equipped with safety valves.

Main bearings

The main bearings are steel shells with lead-bronze lining and electro-plating. One of these bearings is designed as a locating bearing and also features the above layers. The bearing cover is secured by 2 laterally disposed bolts. The lubricating oil for crankpin and piston pin bearings as well as for piston cooling is admitted through the main bearings.

Cylinder liners

The cylinder liners are made of special cast iron and have excellent anti-frictional and anti-wear characteristics. The cooling water jacket extends right up to the collar, which is under extreme thermal load. Efficient cooling and uniform temperature balance are thus ensured. Two O-rings seal off the liner at the lower end.

Cylinder heads

Each cylinder features its own cast-iron cylinder head secured to the engine frame by eight bolts. The cylinder head carries 2 inlet and outlet valves, a starting air valve as well as a fuel injector. Marine engines also have a safety valve. To facilitate maintenance, each valve has its own valve cage so that the valves can be exchanged without the cylinder heads having to be removed. The cooling water spaces in the cylinder heads are so shaped and arranged that efficient heat dissipation is ensured. All cooling water spaces are readily accessible through large covers.

Crankshaft

The crankshaft is an alloyed steel forging. To give good dynamic balancing each web is fitted with a counterweight. Journals and crankpins are ground and polished but not hardened. The lubricating oil is led through drilled passages from the main bearing to the connecting rod bearings. The two-part camshaft drive gear is seated at the coupling end on a collar which stands proud of the journal. If necessary, the "free" end of the crankshaft can be arranged for attachment of an extension shaft and auxiliary drive.

Vibration damper

A vibration damper is fitted to the "free" end of the engine to avoid inadmissibly high vibrations of the crankshaft when passing through critical speed ranges.

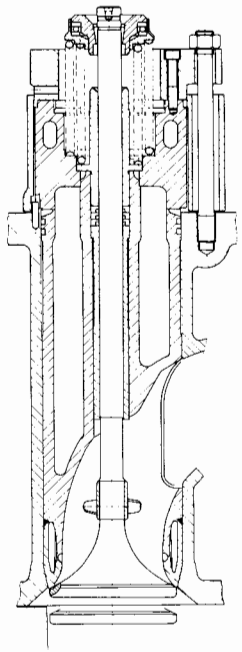
Connecting rods

The connecting rods consists of the rod and rod big end. Thus, during withdrawal of a piston, the rod can be separated from the connecting rod big end without having to remove the connecting rod bearing. All holding bolts of the connecting rod are of highly resistant material. The two big end bearing halves with their thin steel backing and the crankshaft bearings have a lead bronze lining with a thin electro-plated layer. The same applies to the piston pin bush. Drilled passages in the connecting rod shafts lead the oil through non-return valves to the piston pin bearings and the cooling spaces in the piston.

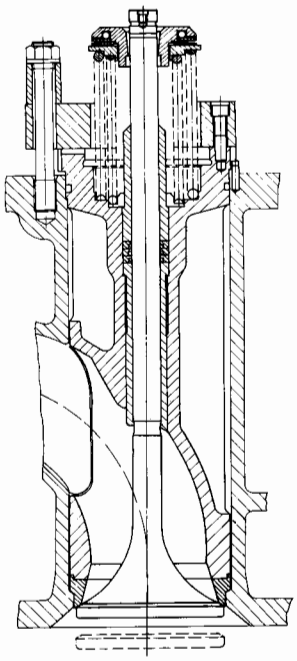
Pistons

The pistons are of two-part construction. It consists of an aluminium body of good wearing characteristics and a steel head of high heat and wear resistance. The two parts are held together by waisted bolts. Each piston features 4 compression rings and 1 oil scraper ring. The piston is cooled by lubricating oil. The piston pin is of the semi-floating type and axially located and sealed off by aluminium discs.

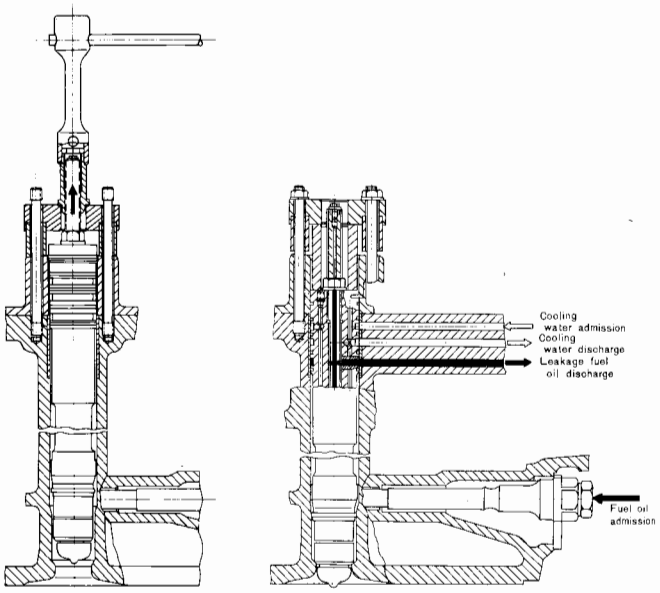
EXHAUST VALVE



INLET VALVE



FUEL INJECTION VALVE



Distribution

The camshaft is underslung in the engine frame and driven by crankshaft through a gear train. The cams operate the fuel injection pumps and, through pushrods and rocker arms, the inlet and exhaust valves in the cylinder head. The cams for operating the fuel injection pumps are adjustable. In marine engines, the cams are duplicated and the camshaft is shifted axially by hydro-pneumatic action for reversal.

Valves

Each inlet and each exhaust valve has two springs. A special device turns each valve cone after each stroke and, thus, considerably extends its service life. The valve stems are sealed with ring packs whose design prevents blow-by and ensures correctly metered stem lubrication. The exhaust valves are cooled up to the valve seat.

Fuel system

An independent fuel delivery pump draws the fuel from the daily service tanks forcing it via a double filter to the injection pumps. Each working cylinder features an M.A.N.-type injection pump with single-plunger and helical-edge control. The point at which injection commences can be altered by adjusting the fuel cam. The fuel needle valve incorporated in the cylinder head is cooled by water.

Lubricating system

All lubricating points are connected to the force-feed lubrication circuit. The lubricating oil is supplied by means of an independently driven pump, which is detached from the engine. The lubricating oil is cleaned in an automatic filter with a very fine mesh. An indicator filter is arranged after this unit to increase operational safety by triggering an alarm if irregularities occur with the automatic filter. An adequate supply of lubricating oil to the piston is ensured even at low speed by separate spray nozzles. The valve gear on the cylinder head which is sealed off by means of a removable oil-tight cover is connected to the forced lubrication system. The oil pressure of the entire bearing lubricating system can be adjusted by means of a regulating valve.

Cooling system

Cylinder liners, cylinder heads, and outlet valve cages are freshwater cooled. The requisite cooling water pumps and heat exchangers have independent drives and are separate from the engine.

Starting system

The engine is started by compressed air of 10 – 30 bar. The starting-air valves are pneumatically opened by means of a cam-controlled single slide valve and closed by spring force.

Control

The quantity of fuel supplied by the fuel injection pump to the injectors is controlled as a function of the engine load and speed required. A shut-down plunger is fitted to each fuel pump so that the engine can be immediately stopped in an emergency – such as overspeeding because of a jammed fuel admission control linkage or upon low lubricating oil pressure.

Operation

All controls are neatly arranged at the coupling side of the engine. In marine propulsion engines all manoeuvres such as starting, reversing, fuel control and stopping of the engine can be executed there. The engine can be operated from the bridge or from a central control room by using an automatic remote control system. Remote monitoring, warning and safety systems can be connected for fully automated operation with unmanned machinery space.

Exhaust gas turbo-charging

The energy contained in the engine exhaust gases is used in the turbo-charger for increasing engine output. The compressed charge air is recooled in an engine-mounted gilled-tube radiator fed with water or, in the case of stationary plants, some other coolant, through which air is passed.

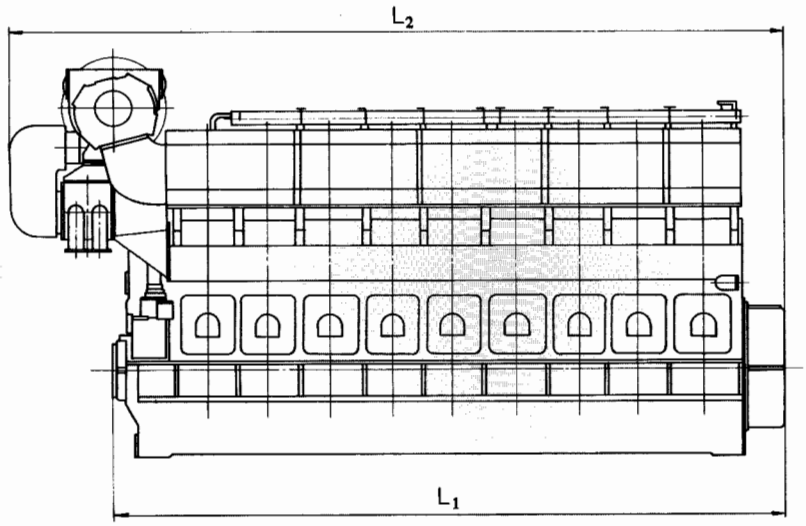
GENERAL

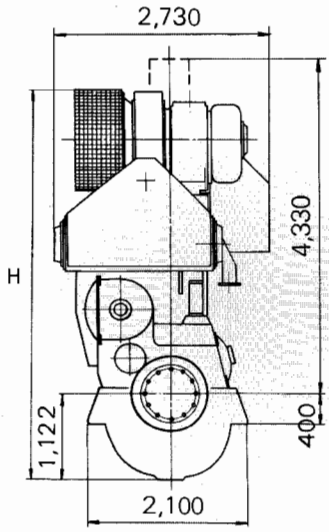
All information and data given in this pamphlet correspond to engine design at the time of going to print and are subject to change without prior notice.

4-STROKE TRUNK PISTON TYPE (ISO METRIC SCREW)

Cylinder Bore . . . . . 520 mm
Piston Stroke . . . . . 550 mm
Cylinder Distance . . . . . 800 mm (Line type)
Cylinder Output . . . . . 1,055 BHP (775 KW)
Fuel Consumption (10,200 Kcal/kg) . . . . . 147 gr/BHP·hr. +3%

		L 52/55A		Length		Height	Weight	
Engine Speed rpm		430	450					
Mean Piston Speed m/s		7.88	8.25					
Mean Effective Press. kg/cm² (bar)		18.06 (17.7)	18.06 (17.7)	L_1	L_2	H	Engine	Spares & Tools
Engine Type	No. of Cylinders	Maximum Continuous Rating BHP (KW)		mm	mm	mm	ton	ton
6L 52/55A	6	6,030 (4,440)	6,330 (4,650)	6,260	7,400	5,000	88	7.5
7L 52/55A	7	7,035 (5,180)	7,385 (5,425)	7,060	8,300	5,200	101	
8L 52/55A	8	8,040 (5,920)	8,440 (6,200)	7,860	9,100	5,200	112	
9L 52/55A	9	9,045 (6,660)	9,495 (6,975)	8,660	9,900	5,200	123	





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