Marine Diesel Engine Piston

Marine Diesel Engine Piston:

Marine Engine Pistons are critical components of marine engines. It works by transferring the force output of expanding gas in the cylinder to a crankshaft. It exposed pistons to heat and gas load, so the piston material must consider thick enough to bear the mechanical load and thin enough to minimize the thermal stress.

The piston skirt, piston rod, and trunk piston are three components of the piston rings arrangement in marine diesel engines.

Two Types of Pistons

- Crosshead Piston

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– Used in 2-Stroke Engines

The crosshead piston is not directly coupled with the crankshaft. It is connected to the crosshead bearing by a piston rod and through the connecting rod; it is connected to the crankshaft. Through the crosshead guides, transverse stress is transmitted, reducing the side trust in the piston.

Based on the cooling medium, crosshead pistons are divided into water-cooled pistons and oil-cooled pistons. Water-cooled pistons are an old design.

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Trunk Piston

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– Used in 4-Stroke Engines

The trunk piston is connected to the connecting road through a gudgeon pin. Hence, the elongated skirt (trunk) takes the side trust and transmits it to the cylinder liner.

Piston Skirt Piston rods Trunk Piston

Piston Skirt

The piston skirt is fitted in both two-stroke and four-stroke engines. Different functions for different engines. In two-stroke engines with uni-flow scavenging, these skirts are short, fitted to act as a guide and to stabilize the position of the piston inside the liner. Pistons are made of cast iron. The diameter of the skirt is always slightly larger than the piston, to prevent damage to the liner surface because of the piston motion.

It also fits soft bronze rings in piston skirts. These bronze rings help during the running-in of the engine, and they are replaceable.

The skirts are larger in two-stroke engines as these help in blanking off the scavenge and the exhaust ports in the liner.

Piston rods

Piston rods are generally found in large two-stroke engines. Piston rods help in transmitting the power produced in the combustion space to the crosshead and the running gear of the engine.

The lengths of these rods depend on the engine stroke's length and the manufacturers' design. The top end of the rod is flanged or attached to the underside of the piston, and the bottom end is connected to the crosshead.

The piston rod passes through the piston gland or stuffing box so it must have a smooth surface and low coefficient of friction.

Trunk Piston

Trunk piston is a term given to the pistons in four-stroke medium-speed engines. These pistons have a composite design that comprises a thin sectioned alloy steel piston crown along with an aluminum alloy skirt. These pistons are light, strong, and rigid in construction and are capable of resisting high temperatures and corrosion.

The piston is forged and integral with the cooling space, which is cooled by cooling oil. The skirt consists of space for a gudgeon pin, which transmits power to the connecting rod. The skirt also helps in transferring the side thrust produced by the connecting rod.

The piston consists of ring grooves for fitting the piston rings. The landing of piston rings is hardened and chrome plated to reduce wear. The top surface of the crown may be recessed to provide clearance for inlet and exhaust valves. Compression rings are fitted in the crown and are generally plasma coated, whereas other rings are chrome plated. The oil control ring is fitted on the top of the piston skirt.

Diesel Engine Piston Material

- **Crosshead Piston Material** – Used in 2-Stroke Engines

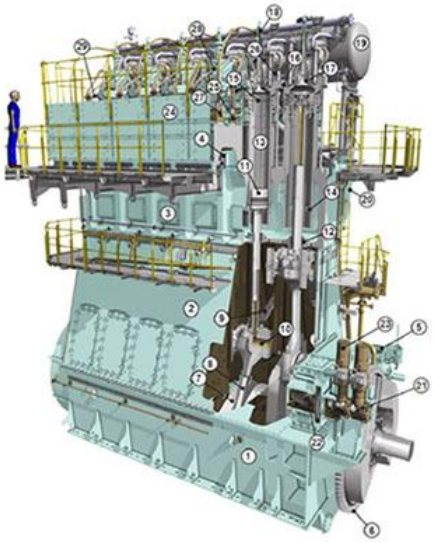
1. **Piston Crown:** Forged steel, including chrome-nickel molybdenum alloy steel

2. **Piston Skirt:** Cast Iron
3. **Piston Rod:** Forged steel

- **Trunk Piston Material** – Used in 4-Stroke Engines

1. **Piston Crown:** Cast Iron or Forged steel
2. **Piston Skirt:** Ai-Si Alloy or nodular CI
3. **Gudgeon pin:** Carburising steel
4. **Connecting Rod:** Forged steel

Engine Piston Spares:



1. Bedplate
2. Column
3. Cylinder block
4. Tie rods
5. Turning gear
6. Flywheel
7. Crankshaft
8. Connecting rod
9. Knee lever
10. Crosshead
11. Piston
12. Gland box piston rod
13. Cylinder liner
14. Scavenge air ports
15. Anti-polishing ring
16. Cylinder cover
17. Exhaust valve
18. Exhaust valve drive
19. Exhaust manifold
20. Scavenge air receiver
21. Supply unit
22. Gearwheel supply unit
23. Fuel pumps
24. Rail unit
25. Fuel common rail
26. Fuel Injector
27. Servo Oil Rail
28. High pressure pipes
29. Starting air valve

Marine Engine Piston Brands

SULZER, MAN, MAN B&W, S.E.M.T. PIELSTICK, WÄRTSILÄ, AKASAKA DIESELS, HANSHIN DIESEL, DAIHATSU, NIGATA, Cummins, CAT Marine Power, DEUTZ, MAK, SCANIA

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