Blog

Different Types of Cylinder Liner – Dry Cylinder Liners vs. Wet Cylinder Liners vs. Air-Cooled/Finned Cylinder Liners

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Before getting to the different types of **Cylinder Liners**, first, let's understand what is a Cylinder Liner?

When considering Engine parts of a vehicle, Cylinder Liner or Sleeve is one of the most crucial elements of an Engine.

It is a hollow cylindrical bore which acts as an enclosure in which the combustion of fuel takes place.

Cylinder Liner or Sleeve is a cylindrical component that is removable which is fitted in the Engine Block which provides the surface for the piston to reciprocate internally and carry out its compression. Cylinder Liners can be easily replaced when it wears out.

And due to Pistons' critical movement during its functioning, Cylinder Liners must be Wear-resistant & Corrosion-resistant. Which means a Cylinder Liner should be of high strength.

Material Used in Cylinder Liners:

Since a Cylinder Liner should be of high strength, Cylinder Liners are generally made up of grey cast iron material.

How is a Cylinder Liner manufactured?

Cylinder Liners are usually manufactured using a centrifugal casting process.

Grey cast iron is heated in the induction furnace and the molten metal is taken to the centrifugal casting machinery.

A permanent mold is rotated continuously about its axis at high speeds as the molten metal is poured causing the metal to distribute itself evenly around the die.

The resulting casting is of much finer grain and free from blow holes and porosity than a usual casting process.

Corrosion resistance is further improved by adding chromium.

Now let's get to the main purpose of this article i.e. to explain the different types of Cylinder Liner.

Types of Cylinder Liner:

Cylinder Liners are categorized in predominantly 3 types depending upon its method of Cooling.

Dry Type Cylinder Liner:

Dry Type Cylinder Liner is the most common type of cylinder liner. It works under high pressure and temperature and hence has to be made up of cast iron and ceramic-nickel plating which are high-grade materials.

Dry Liners material Composition mostly includes Cast Iron and Ceramic-Nickel Compounds which gives it several features which are not achievable in Wet Liners

A cylinder block with Dry Liners is more robust than its counterpart, wet liner liners.

Dry liners are relatively thinner than Wet liners.

Dry liner is not in direct contact with the coolant but protects Piston from wear and impurities.

Dry liner fits directly against the wall of the cooling jacket in the cylinder block.

Advantage of Dry Cylinder Liner is that its replacement is easy and it has no exposure to water jacket difficulty. Dry Liners can be used in almost all kinds of Engines.

Disadvantage of Dry Cylinder Liner is that the Cylinder block in which it is fitted is difficult to manufacture and heat dissipation is not quite efficient.

Wet Type Cylinder Liner:

Wet type Cylinders are made up of the same material as of Dry Type Cylinder Liner.

Wet Liners interact with Engine coolant directly to protect the Piston.

Wet Liners have better heat dissipation and cooling than Dry-type Cylinder Liner.

passages.

And in Wet liners which do not have integral cooling passages, the water jacket is formed by the liner and a separate jacket which is a part of the block.

A static seal must be provided at both the combustion and crankshaft ends of the cylinders to prevent the leakage of coolant into the oil pan sump, or combustion space.

Generally, the seal at the combustion end of a liner consists of either a gasket under a flange or a machined fit.

The wall of the Cylinder Liner must to strong enough to withstand the combustion pressure.

Advantage of Wet type Liner is that it is comparatively easy to manufacture, Cooling is more effective and longitudinal stress is relieved due to thermal expansion of liner.

Disadvantage of Wet type Liners is that its replacement is difficult and there is a risk of water leakage problems.

Air-Cooled or Finned Cylinder Liner:

Air Cooled Cylinder Liners are made from special “Shell Moulding Process” having wear-resisting, close-grained, iron casting to ensure long life and efficient cooling.

As the name suggests, Air Cooled Liners are specifically designed for Air-Cooled Engines. Air Cooled Liners are most commonly used in Automobiles.

It’s working is the same as Dry Cylinder Liner but the cooling Medium in this scenario is air.

Heat dissipation of Air Cooled Liner is carried through the mode of Forced convection with the help of its fins which is applied on its surface. Typically, the material of the Fin has a high thermal conductivity.

Advantage of Air Cooled/Finned type Cylinder Liner is that it is resistant to corrosion and it has very effective heat dissipation.

Disadvantage of Air-Cooled Cylinder Liner is that it is designed to support an Air Cooled Engine and thus cannot be installed in any coolant based Mechanism.

You can learn more about how we manufacture our Cylinder Liners at www.atracparts.com/cylinder-liners