

Basic Principles of Brakes

1. What is a Brake?

It is a device that utilizes friction to cause a vehicle to decelerate and/or stop by converting kinetic energy into heat energy. Sudden braking at 100 km/h generates enough heat to raise the temperature of two liters of water from 0°C to boiling (100°C). Brakes are relatively small compared with other major automobile parts, and the space where they are mounted is restricted. Complex controls are required to absorb the output power of the engine and brake safely. Brakes are also considered an important safety part in an automobile because of their key role in ensuring vehicle safety.

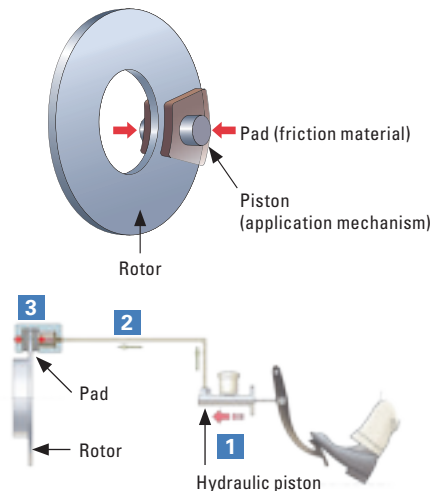
2. Types of Brake

Each of the four wheels on an automobile is equipped with a brake. Depending on the usage and characteristics of the car, the wheels may have disc brakes or a drum brakes. Disc brakes have the capability to stop a car in a stable manner even at a high speed, while drum brakes have the capability to stop heavier vehicles.

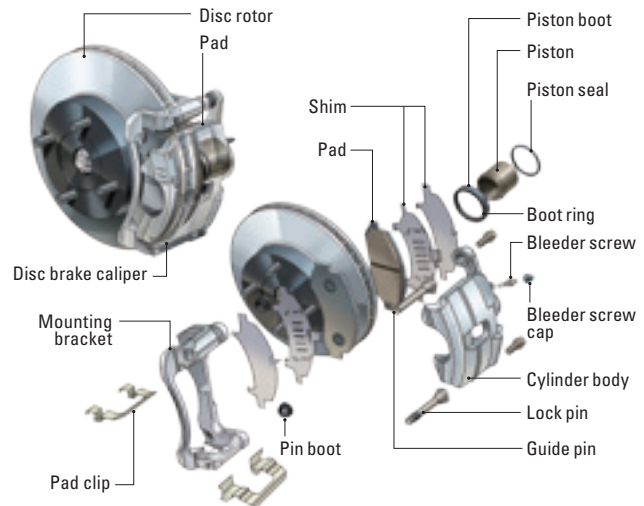
A vehicle can be equipped with different combinations of disc and drum brakes. Some vehicles use disc brakes on the front and rear wheels, while others use disc brakes on the front and drum brakes on the rear.

Disc brakes

Brake pads clamp the rotor to stop its rotation

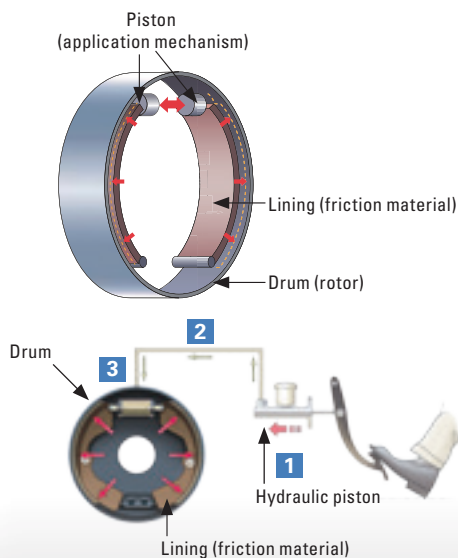


Main Parts of Disc Brakes

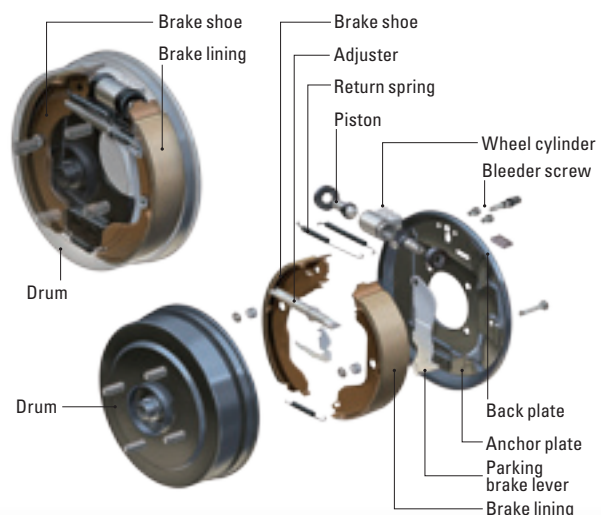


Drum brakes

Lining is pushed out to drum from the inside to stop its rotation



Main Parts of Drum Brakes



3. Intermixing of Friction Materials

Disc brake pads and drum brake linings are made by intermixing 10 to 20 kinds of raw materials. Since the required performance varies depending on the customer and vehicle type, we have been changing the raw materials and compositions that we use. The performance requirements for friction materials are that they not be easily affected by the usage environment, heat resistance, mechanical strength, durability, less noise and vibration, and environment-friendly material. Akebono develops and produces high quality products that deliver safety and security to customers based on its unique knowhow and manufacturing technology.

Friction Raw Materials

Binders



Phenol resin

Reinforcements



Aramid fiber



Steel fiber

Friction Modifiers



Graphite



Cashew particle

4. Aftermarket Parts Business

Akebono products have been adopted as OEM brakes (fitted in new cars) by major global automobile manufacturers. Akebono provides high quality aftermarket brake products developed and produced with high technology knowledge gathered from the OEM business provided to customers throughout the world.

Brakes support customer safety and security throughout the vehicle's life cycle, from the time the new car starts running until the end of its lifetime. During this lifecycle, the aftermarket brake parts are replaced when necessary, for example, when the brake pads and linings are worn away. Akebono provides aftermarket parts for both automaker dealers and the Akebono brand globally. The Company carefully analyzes customer needs and plans and develops aftermarket brakes that customers can choose from.



Aftermarket brake pads for the Japanese market



Aftermarket brake pads for the U.S. market



K4 disc brakes for mini cars* launched in Japan (* Displacement under 660cc)

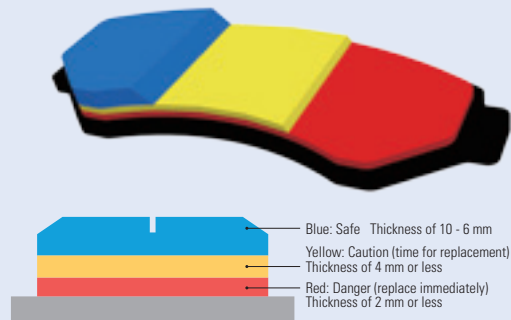
Advice to Customers

Criteria for Brake Pad Replacement

Brake pads will wear and become thinner through continuous use, which might cause damage to the disk rotors and could lead to replacement of the entire brake.

The thickness of the new pad is about 10 mm (1 cm). It can be used at a thickness of about 7 to 8 mm. When residual thickness is 4 mm or less, we recommend pad replacement for safety's sake.

As these are only guidelines, please check the residual thickness of the pads at a car maintenance facility.



Blue: Safe Thickness of 10 - 6 mm
 Yellow: Caution (time for replacement) Thickness of 4 mm or less
 Red: Danger (replace immediately) Thickness of 2 mm or less