

Common disc braking system problems and how to solve them:



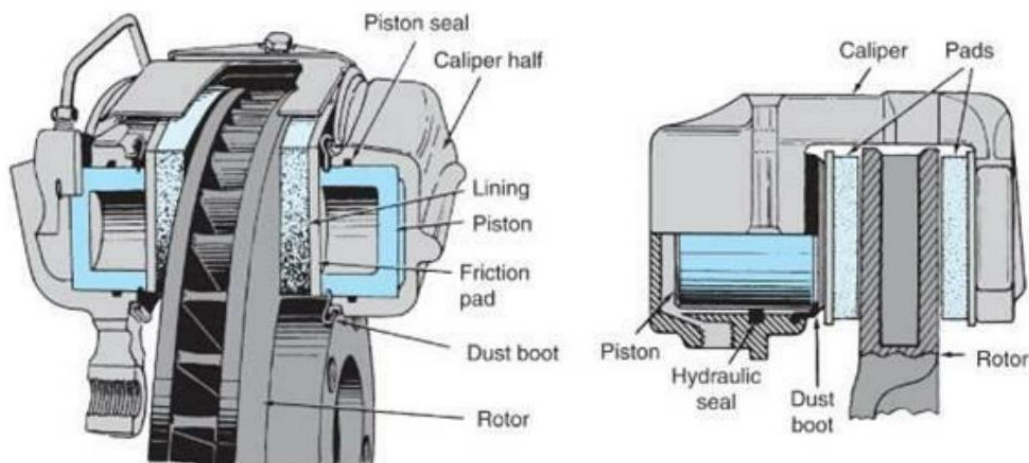
In this manual, we are going to try to solve all possible doubts about the different problems that the disc braking system can present. Our objective is to cover the largest possible casuistry in order to be able to solve the greatest number of situations.

First of all, we must know the components of the disc braking system, which are:

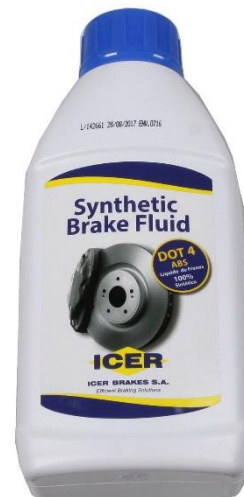
- **Disc:** Normally made of grey cast iron due to its good friction properties, wear resistance, corrosion resistance, as well as its great capacity to dampen vibrations. They can be solid or ventilated and, broadly speaking, they are responsible for offering a friction surface on which to exert the braking force of the pads, as well as dissipating a large part of the heat generated while braking.
- **Brake pads:** Designed to work in contact with the brake disc. Through friction, it transforms the kinetic energy of the vehicle into dissipated heat energy. The brake pads and more specifically those of **ICER BRAKES** are designed to work optimally whatever the braking condition (high speed, high temperature, high deceleration, etc ...). They are manufactured by mixing different raw materials. Depending on this composition, we speak of semi-metallic, low steel or NAO materials. Each of them have their specific strengths and weaknesses.



- **Brake caliper (fixed or floating):** It is responsible for converting the hydraulic pressure of the brake fluid into a normal force to the disc, exerted through the pad. Depending on whether the caliper has a relative displacement in front of the brake disc or not, it is called a floating or fixed brake caliper respectively. The fixed caliper has at least one brake piston on each side of the disc, while the floating caliper only has brake pistons on one side of the disc.



- **Brake fluid:** This is the fluid that circulates inside the braking system ducts, from the brake master cylinder to the piston caliper. Like other liquids, it is incompressible. It will become compressible when it stops being a liquid and turns to a gaseous state (boiling point). Depending on the brake fluid we use, we will have a higher or lower boiling point. The risk of this liquid is its hygroscopicity (ability to absorb moisture) and the consequent drop in the boiling point. If this happens, the force of pressing the break pedal would be used to compress the gas generated inside the circuit instead of being transmitted in its entirety to the piston of the brake caliper.

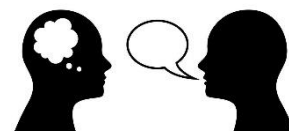


- **Pedal, brake booster and master cylinder:** The brake pedal is the first part of the braking system and is the only part of it that comes into direct contact with the driver of the vehicle. The brake booster has the function of helping increase the force exerted on the pedal. The master cylinder has the inverse function of the caliper, since it is in charge of converting the force that comes from the brake booster into hydraulic pressure.



In order to make a good diagnosis and be able to properly identify the problem, the next steps must be followed:

Step 1: Talk to the client to discern his feelings and thus be able to focus on the problem. If possible, we will try to reproduce the problem by driving the car on a closed road so that there is no danger to other drivers. If possible, an attempt will be made for the vehicle to be driven by the customer himself. Problems may not be detected if the driver is the workshop technician, since one's way of driving has a great influence on the repetitiveness of the problems.



Step 2: Check the correct operation of the brake pedal and the hand brake lever. If the height of the brake pedal is noted to be low, the points that jump when activating the handbrake lever should be checked. This should jump between 3 and 7 points. If the 10 points are exceeded, we must check the rear axle brakes.

Step 3: Safety hoist the vehicle and remove the wheels. Perform a visual inspection of:

- Brake hoses looking for possible wear or damage.
- Brake discs looking for grooves, scratches, cracks, or rust.
- Brake calipers looking for possible leaks or damaged parts.



Step 4: Remove the disc brake calipers and check the condition of the disc brake pads. Their thickness should be measured, as well as a visual inspection in search of cracks, material detachments, fluid spillage stains, etc ...



Step 5: Clean all components well and properly and replace all those that do not meet the manufacturer's specification. Also, check the brake fluid level. It is advisable to change it every 2 years or 48,000 km.

Step 6: Perform a test drive to verify that the problem has disappeared.

From what the customer tells us and from the verification process, we can try to trace the causes of the problem in question:

The car pulls to one side during braking:

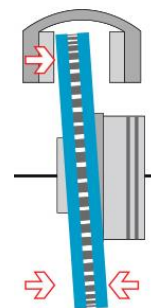
Possible causes:

- Incorrect tire pressure or unequal tires.
- Wheel out of alignment
- Restricted brake hose
- Caliper stuck, seized or loose
- Damaged or contaminated friction material (with grease or brake fluid)
- Loose suspension parts

“Roughness” or vibration of the brake pedal.

Possible causes:

- Excessive lateral run-out of the disc. The "run-out" can be understood as an off center disc with respect to its axial plane coupled with a rotational movement. This results in a vibration of the pedal, steering wheel or the interior cabin of the vehicle.
- Parallelism between disc faces out of specification
- Wheel bearings damaged or out of adjustment
- Pad material worn down to steel support
- Worn, damaged (grooving) or cracked brake discs



Excessive pedal effort:

Possible causes:

- Incorrect, seized or jammed caliper assembly
- Seized brake pedal mechanism
- Caliper piston stuck or slipping badly
- Incorrect assembly of components (pads and disc)

Excessive pedal travel:

Possible causes:

- Air in the brake fluid circuit
- Insufficient liquid
- Liquid contaminated with water (if it occurs at high temperature)
- Brake fluid leak at any point in the circuit or component (pump or caliper)
- Bent brake pad

Brake system with residual braking torque (dragging brakes).

Possible causes:

- Pressure “trapped” in the braking circuit due to some obstruction
- Brake caliper seized or with unlubricated guides
- Damaged brake piston seal

High sensitivity of the braking system in low load brakings (disproportionate response).

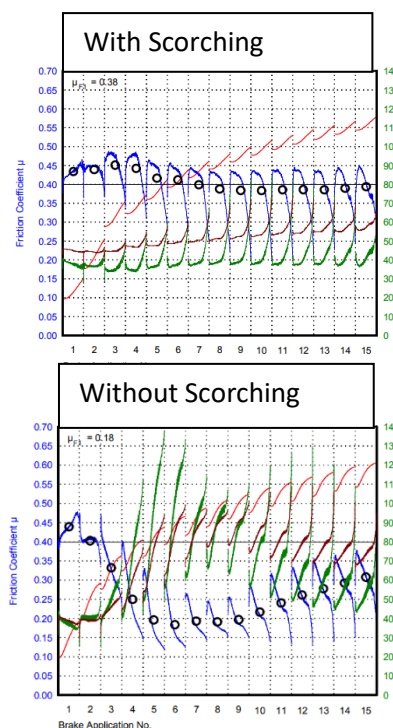
Possible causes:

- Defective dosing valve
- Inadequate friction material. ICER Brakes recommends mounting its pads to avoid this problem.
- Improper disc friction surface finish

Loss of braking efficiency at high temperature or high speed.

Possible causes:

- Inadequate friction material or no "scorching" process. The "scorching" is a productive process in which the pad is subjected to a high temperature on the friction surface, thus managing to burn part of the surface organic components. This process is a preliminary simulation of the extreme conditions that the pad could be subjected to in the future. In this way, we prevent the pads from suffer a “fade” effect (momentary loss of the friction coefficient the first time the pads undergoes extreme heating). In the image on the right we can see this loss of coefficient (blue line) when the temperature rises (red line). ICER Brakes recommends mounting its pads to avoid this problem.
- Improper brake disc. ICER Brakes recommends mounting its discs to avoid this problem



Noise while braking.

Possible causes:

- Discs and pads contaminated with some type of external agent
- Anti-noise shims displaced, damaged or bent
- Ungreased braking system (guides)
- Inadequate friction material. ICER Brakes recommends mounting its pads to avoid this problem
- Improper or worn brake disc. ICER Brakes recommends mounting its discs to avoid this problem
- Excessively worn disc in which an upper “lip” has appeared that prevents the perfect fit of the new set of pads to the disc
- Loose or deteriorated suspension components
- Loose or damaged wheel bearings
- Brake pads and disc without the necessary bedding (the problem will disappear only with time).

These are the most generic problems that can appear in the disc braking system. Obviously, they are not the only ones and there will be cases that require a detailed study.

ICER Brakes S. A. recommends always mounting its components to have a safe, comfortable and satisfactory driving experience.