



Common disc braking system problems and how to solve them

Icer Brakes S.A.

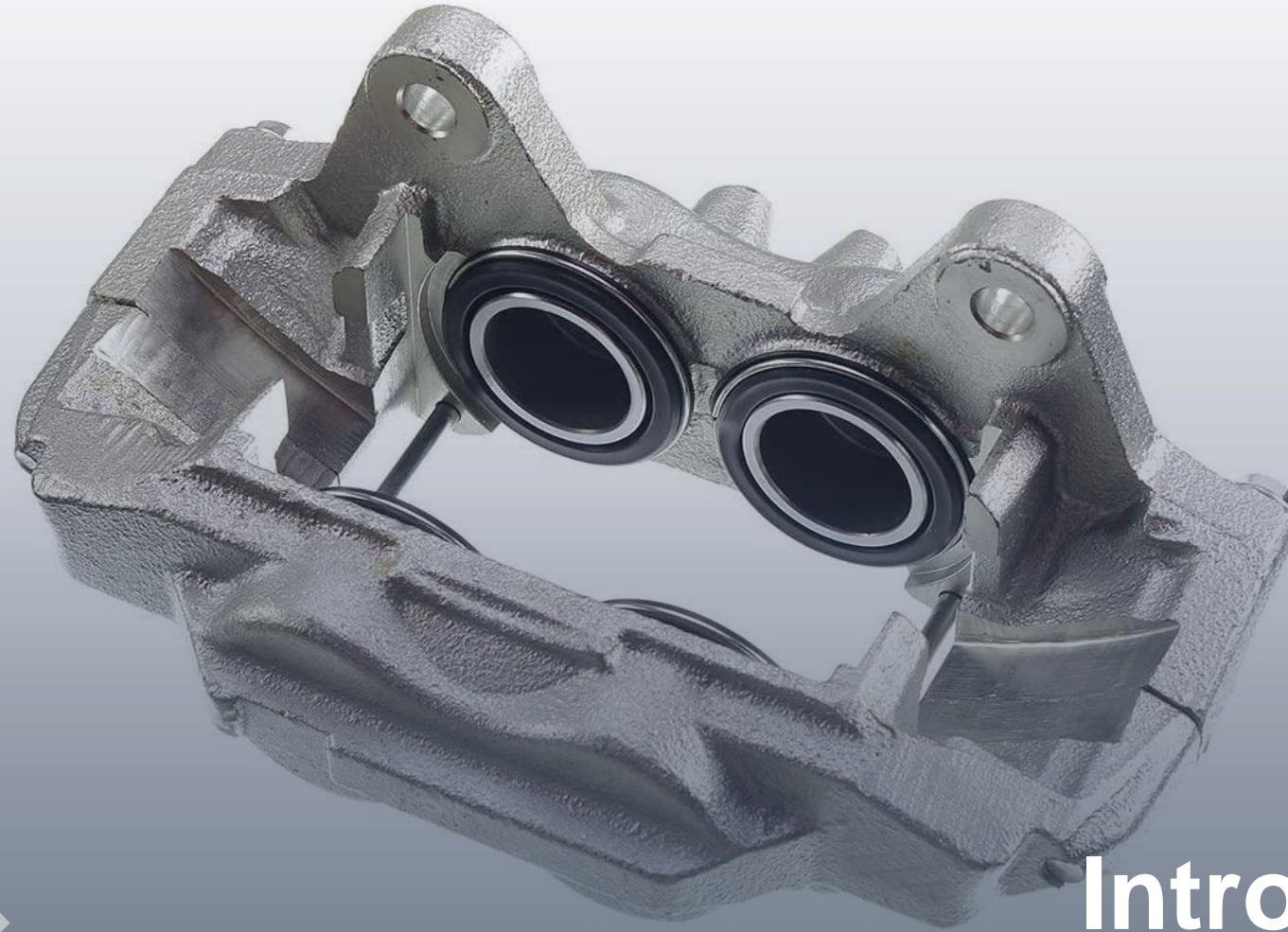
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Introduction: Disc Brake system components

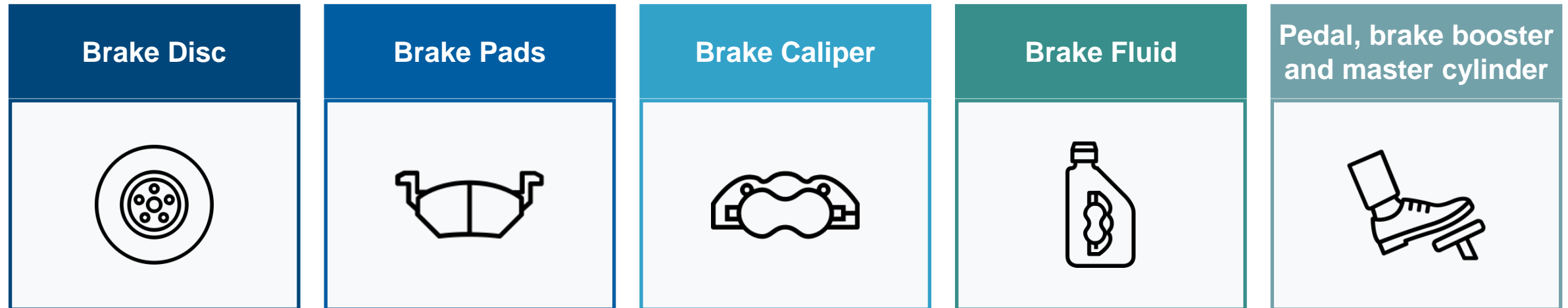
Common disc braking system problems and how to solve them

Introduction

Objective and previous concepts

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 include the greatest number of situations.

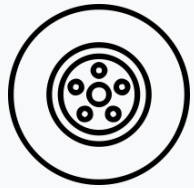
First of all, we must know the **components of the disc braking system**, which are:



Introduction

Disc Brake system components: Brake Disc

Brake 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.

Introduction

Disc Brake system components: Brake Pads

Brake Pads



- Designed to work in contact with the brake disc. Through friction, they transform the kinetic energy of the vehicle into dissipated heat energy.
- **Brake pads**, and more specifically **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 differentiate between semi-metallic, low steel or NAO materials. Each of them have their specific strengths and weaknesses.

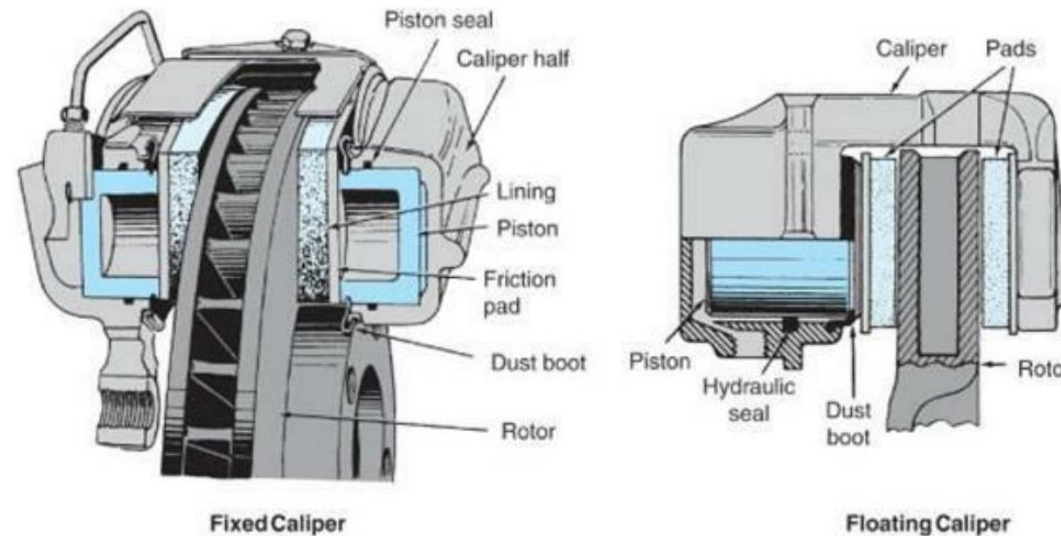
Introduction

Disc Brake system components: Brake Caliper

Brake Caliper



- 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.



Introduction

Disc Brake system components: Brake Fluid

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 used, there is 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 entirely to the piston of the brake caliper.



Introduction

Disc Brake system components: Pedal, brake booster and master cylinder

Pedal, brake booster and master cylinder



- The **brake pedal** is the **first part of the braking system** and it is the only part 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**.





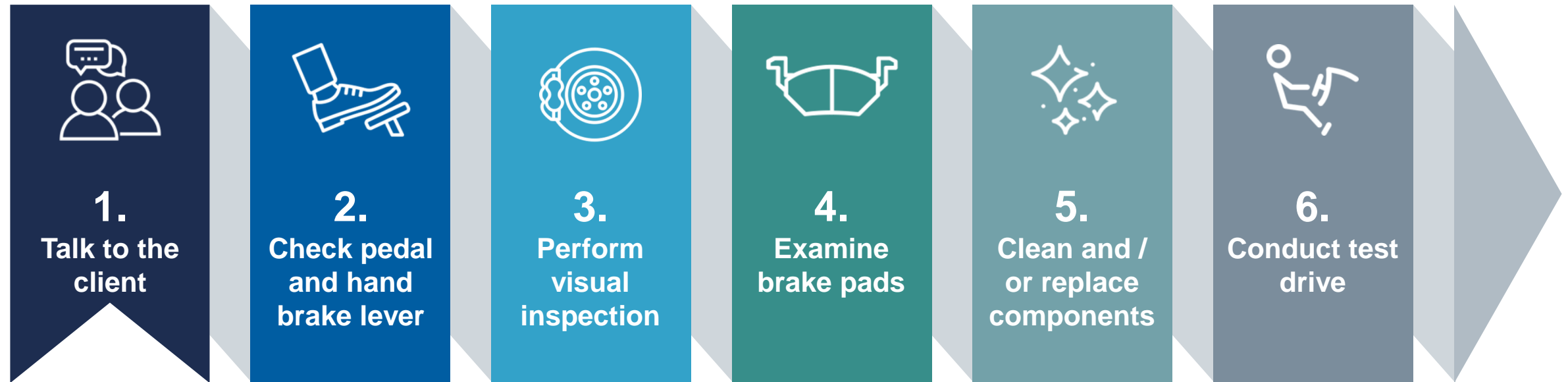
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Procedure for diagnosis

Procedure for diagnosis

Steps for a proper diagnosis

In order to correctly diagnose and properly identify the problem, the next steps must be followed:



Procedure for diagnosis

Steps for a proper diagnosis



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, we will ask the customer to drive the vehicle himself. Problems may not be detected if the driver is the workshop technician, since **the person's way of driving has a great influence on the repetitiveness of the problems.**

Procedure for diagnosis

Steps for a proper diagnosis



Step 2: Check the correct operation of the brake pedal and the hand brake lever.

Check the proper operation of the brake pedal.

Also, it is important to check the points that jump when activating the hand brake lever. It should jump between 3 and 7 points. If the 10 points are exceeded, we must check the rear axle brakes.

Procedure for diagnosis

Steps for a proper diagnosis



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.

Procedure for diagnosis

Steps for a proper diagnosis



Step 4: Remove the disc brake calipers and check the condition of the disc brake pads.

Measure thickness of the brake pads and conduct a visual inspection searching for cracks, material detachments, fluid spillage stains, etc.

Procedure for diagnosis

Steps for a proper diagnosis



Step 5: Clean and/or replace brake components

Clean all components 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 50,000 km.



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



Potential problems and how to solve them



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Common disc braking system problems and how to solve them

Potential problems and how to solve them

1. The car pulls to one side during braking



When braking, the car suffers a deviation in its trajectory.

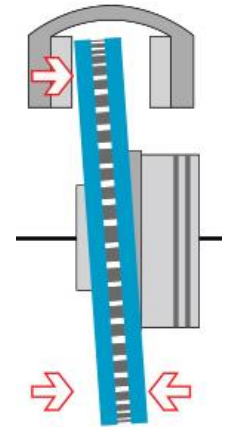
 Possible causes	 Solutions
Incorrect tire pressure or unequal tires	Adjust the tyre pressure to the pressure indicated by the manufacturer and install the same tyre types per axle.
Wheel out of alignment	Perform steering alignment and correct any possible looseness.
Restricted brake hose	Repair or replace the hose.
Stuck, seized or loose caliper	Solve this problem by replacing the main piston and the guides, and make sure that the caliper is correctly assembled. If necessary, replace the caliper.
Damaged or contaminated friction material (with grease or brake fluid)	Locate the leakage point and replace the damaged pad set (complete axle).
Loose suspension parts	Secure or replace loose parts.

Potential problems and how to solve them

2. “Roughness” or vibration of the rake pedal

When braking, we notice a vibration of the brake pedal or a brake roughness feeling.



 Possible causes	 Solutions
Excessive lateral run-out of the disc (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.	Replace damaged disc set (complete axle).
Parallelism between disc faces out of specification	Replace damaged disc set (complete axle).
Wheel bearings damaged or out of adjustment	Adjust or replace bearings.
Pad material worn down to steel support	Replace brake pads set. If disc is damaged, replace discs set too.
Worn, damaged (grooving) or cracked brake discs	Replace damaged disc set (complete axle).



Potential problems and how to solve them

3. Excessive pedal effort



The brake pedal does not behave normally, and it offers greater resistance to movement, forcing us to press the pedal with greater effort.

 Possible causes	 Solutions
Incorrect, seized, or jammed caliper assembly	Inspect assembly and clear seizure by replacing main piston and guides if necessary.
Seized brake pedal mechanism	Grease the sliding parts and check.
Caliper piston stuck or slipping badly	Replace the main piston.
Incorrect assembly of components (pads and disc)	Inspect assembly and replace damaged components if necessary.

Potential problems and how to solve them

4. Excessive pedal travel



The brake pedal does not behave normally, and it extends all the way to the end.

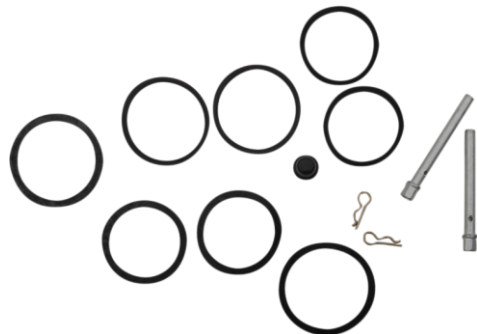
 Possible causes	 Solutions
Air in the brake fluid circuit	Bleed the circuit and refill brake fluid.
Insufficient liquid	Fill the brake fluid deposit to the recommended level and bleed the system.
Liquid contaminated with water (if it occurs at high temperature)	Replace all the brake fluid in the system (recommended every 2 years).
Brake fluid leak at any point in the circuit or component (pump or caliper)	Locate leakage, replace damaged part and refill brake fluid.
Bent brake pad	Replace brake pads set.

Potential problems and how to solve them

5. Brake system with residual braking torque (dragging brakes)

The car brakes when we are not pressing the brake pedal.



 Possible causes	 Solutions
Pressure “trapped” in the braking circuit due to some obstruction	Locate blockage and replace hose.
Brake caliper seized or with unlubricated guides	Solve this problem by replacing the main piston and the guides.
Damaged brake piston seal	Replacement of the piston seal.



Potential problems and how to solve them

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

When pressing the brake pedal lightly, the response of the system is disproportionate, causing abrupt braking.

 Possible causes	 Solutions
Defective dosing valve	Replace valve
Inadequate friction material	Replace brake pads set with a premium quality set. ICER Brakes recommends installing its brake pads to avoid this problem.
Improper disc friction Surface finish	Replace brake discs set.

Potential problems and how to solve them

7. Loss of braking efficiency at high temperature or high speed

There is a perceived lack of braking power when the braking system is used very repeatedly or when braking at high speed.



Possible causes



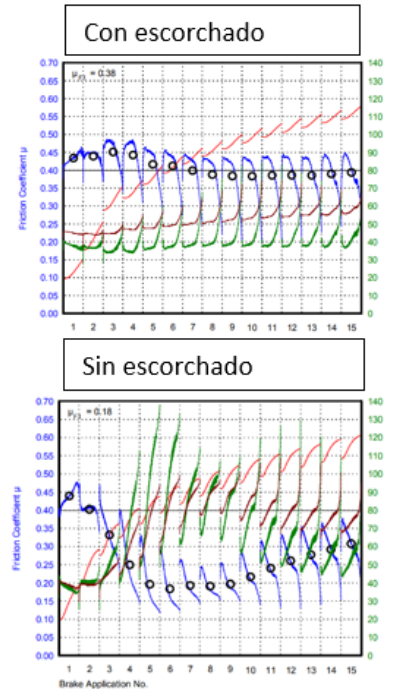
Solutions

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 suffering 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



Replace disc set with a top-quality product. ICER Brakes recommends mounting its discs to avoid this problem



Potential problems and how to solve them

8. Noise while braking

When pressing the brake pedal, there is a more or less intense squealing noise.

 Possible causes	 Solutions
Discs and pads contaminated with some type of external agent	Replace contaminated brake pads sets or brake discs set.
Anti-noise shims displaced, damaged or bent	Replace brake pads set.
Ungreased braking system (guides)	Grease braking system components (guides).
Inadequate friction material	Replace brake pads set with a premium quality set. ICER Brakes recommends installing its brake pads to avoid this problem.
Improper or worn brake disc.	ICER Brakes recommends mounting its discs to avoid this problem. Replace brake discs set with a premium quality set. ICER Brakes recommends installing its brake 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	Replace brake discs set.
Loose or deteriorated suspension components	Adjust or replace suspension components.
Loose or damaged wheel bearings	Adjust or replace bearings.
Brake pads and disc without the necessary bedding	The problem will disappear with time.



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General recommendations

Common disc braking system problems and how to solve them

General recommendations

Common disc braking system problems and how to solve them

This is an overview of the most common 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 recommends always mounting its components to ensure a safe, comfortable and satisfactory driving experience.





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