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# Disc brake

Tips, tests and repair information









# Disc brake

## Tips, tests and repair information

The following descriptions are intentionally general and cannot apply to all vehicles and disc brake designs. The manufacturer's product information have to be observed during repair work.



### 1. Preparatory measures

- ▶ Carry out efficiency test on brake tester
- ▶ Carry out a test drive depending on customer complaint
- ▶ Check wheel bearings, wheel suspension, supporting and guiding joints, axles, suspension, steering, tires and rims
- ▶ Damage to the chassis can have a negative effect on the braking response
- ▶ Checks according to brake checklist

#### Please observe:

Do not operate the brake pedal nor the parking brake while working on brake systems. Make sure to avoid any contamination of brake discs or pads with greases or oils.



### 2. Disassembly

- ▶ Remove coarse contamination prior to disassembly
- ▶ Disassemble brake caliper and brake pads



### 3. Disassembly

- ▶ Suspend brake caliper so that no tensile forces act on the brake hose



#### ESI[tronic]

ESI[tronic] contains further, more comprehensive and vehicle-specific SIS Troubleshooting Instructions with troubleshooting, installation positions, removal, installation and setting instructions as well as tightening torques, test and setting values.



#### Cast steel – safe, perfect, proper

Higher engine performance and vehicle weights place increasing demands on the brake system. Only brake discs made from high-grade materials and homogenous cast structure without internal tension comply with the vehicle manufacturer specifications.

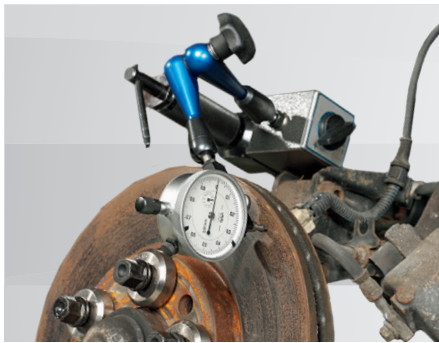


## Disc brake – Tips, tests and repair information



### 4. Checking brake disc (wear dimension)

- ▶ Secure brake disc with spacer sleeves and wheel bolts
- ▶ Determine wear dimension of brake disc with gauge



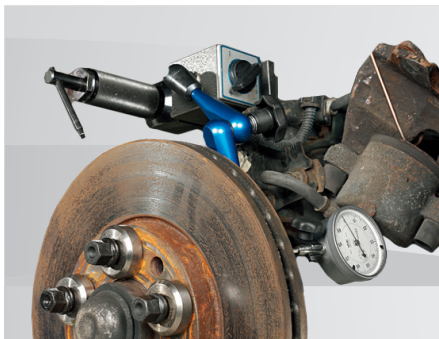
### 5. Checking brake disc (lateral runout)

- ▶ Clamp piston resetting device at spring strut
- ▶ Mount the magnetic base (commercially available) on the base plate of the piston resetting device
- ▶ Install dial gauge in magnetic base
- ▶ Adjust magnetic base so that the dial gauge stylus makes contact approx. 10 – 15 mm from the outer edge on the friction surface and is slightly pretensioned
- ▶ Turn brake disc carefully and measure lateral runout



### 6. Checking brake disc (lateral runout)

- ▶ With ventilated brake discs, carry out measurement also on the inside of the brake disc



### 7. Checking brake disc (thickness difference)

- ▶ Use outside micrometer to determine brake disc thickness at a minimum of 8 points and note measured values
- ▶ The difference between the highest and lowest measured value is the thickness difference

#### Please observe:

We recommend you to repeat these measurements after the assembly of the new brake disc



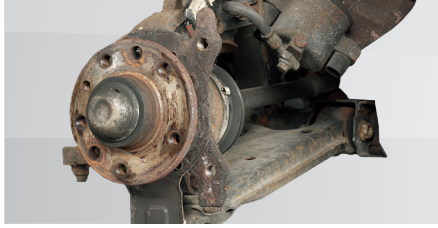


## Disc brake – Identifying and solving the most common problems

	Cause	Effect	Recommendation
<b>Scoring or grooves on the friction surface</b> 	<ul style="list-style-type: none"> <li>▶ Dirt particles on brake disc and pad</li> </ul>	<ul style="list-style-type: none"> <li>▶ Brake noise</li> <li>▶ Rubbing effect during braking</li> <li>▶ Reduced braking performance</li> </ul>	<ul style="list-style-type: none"> <li>▶ When changing the brake discs, always change the brake pads as well</li> </ul>
<b>Uneven wear</b> 	<ul style="list-style-type: none"> <li>▶ Uneven function of the brake caliper</li> <li>▶ Run-out of the brake disc</li> </ul>	<ul style="list-style-type: none"> <li>▶ Poor and/or irregular braking performance</li> <li>▶ Vibration on the steering wheel</li> <li>▶ Pulsing effect on the brake pedal</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the brake caliper and wheel hub when installing new brake discs</li> </ul>
<b>Blue surface discoloration</b> 	<ul style="list-style-type: none"> <li>▶ Overheating due to jammed or seized brake pads</li> <li>▶ Vehicle driven with activated or seized parking brake</li> <li>▶ Brake caliper piston is sticking</li> </ul>	<ul style="list-style-type: none"> <li>▶ Rubbing effect during braking</li> <li>▶ Overheating</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the entire brake system</li> <li>▶ Ensure that the brake caliper is functioning properly</li> </ul>
<b>Indentations on the contact surface</b> 	<ul style="list-style-type: none"> <li>▶ Improper cleaning of the contact surfaces</li> <li>▶ Damage to the contact surfaces through contamination</li> <li>▶ Distortion of the wheel hub</li> </ul>	<ul style="list-style-type: none"> <li>▶ Increased lateral run-out of the brake discs</li> <li>▶ Chattering and rubbing effects</li> </ul>	<ul style="list-style-type: none"> <li>▶ Clean the contact surface of the brake disc and the wheel hub before mounting new brake discs</li> <li>▶ Do not use paste lubricants (copper paste, etc.)</li> </ul>
<b>Corroded friction area</b> 	<ul style="list-style-type: none"> <li>▶ Impact of corrosive substances (e.g. road salt, cleaning agents)</li> <li>▶ Damage through water or lack of use – low demand on the brakes</li> </ul>	<ul style="list-style-type: none"> <li>▶ Noise during braking</li> <li>▶ Irregular braking performance</li> </ul>	<ul style="list-style-type: none"> <li>▶ Replace brake discs and pads</li> <li>▶ Instruct the customer to occasionally stress the brakes by applying pressure appropriately (bed in the brakes)</li> </ul>



# Disc brake – Tips, tests and repair information



## 8. Checking adjacent components

- ▶ Components, such as brake anchor plate, etc. must be disassembled, cleaned and checked
- ▶ Check adjacent components, such as brake hoses

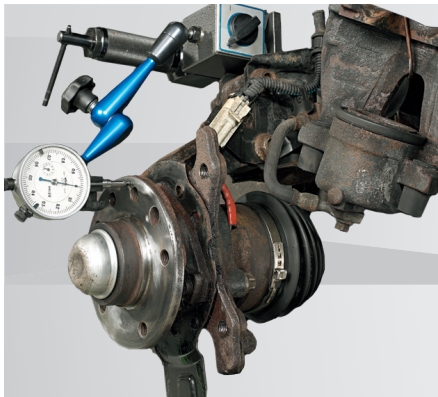


## 9. Preparing wheel hub

- ▶ Prior to installation of the new brake disc, the end face of the wheel hub must be cleaned and checked
- ▶ Clean end face of wheel hub with a special polishing brush

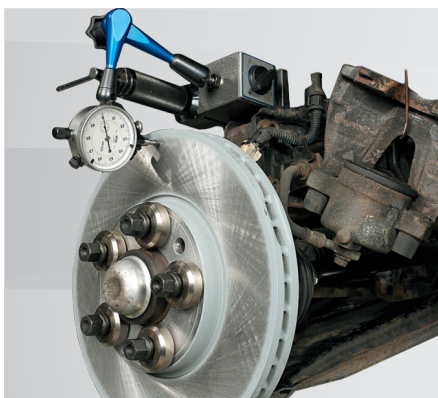
### Please observe:

Not a material removal machining operation



## 10. Checking wheel hub (wobble)

- ▶ Clamp piston resetting device at spring strut
- ▶ Mount the magnetic base (commercially available) on the base plate of the piston resetting device
- ▶ Install dial gauge in magnetic base
- ▶ Adjust magnetic base so that the dial gauge stylus makes contact approx. 2 – 4 mm from the outer edge on the end face and is slightly pretensioned
- ▶ The stylus must not plunge into the wheel bolt threaded bores
- ▶ Turn wheel hub carefully and measure wobble



## 11. Assembly of new brake disc

- ▶ Do not apply lubricants or varnishes to the cleaned, metallic bright end face of the wheel hub
- ▶ Mount new brake disc with secure with spacer sleeves and wheel bolts
- ▶ Carry out lateral runout measurement; offset installation of the brake disc may be necessary

### Please observe:

With ventilated brake discs, carry out lateral runout measurement also on the inside of the brake disc



## 12. Assembly of brake anchor plate

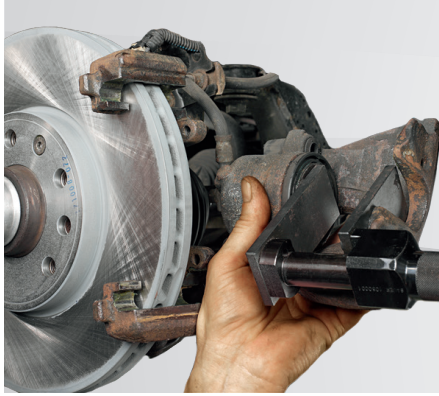
- ▶ Prior to assembly of the brake anchor plate, lubricate the brake pad guides and – depending on the caliper design – the brake caliper guides with Bosch Superfit
- ▶ Install brake anchor plate screws with screw locking compound and tighten (specified torque)

### Please observe:

- Never use lubricants containing copper
- Depending on the vehicle, new screws must be used
- Old screws must be cleaned before they are reused



## Disc brake – Tips, tests and repair information



### 13. Resetting piston (brake caliper without locking mechanism)

- ▶ Completely reset the piston of the brake caliper without locking mechanism using the piston resetting device
- ▶ With the fixed caliper version, then check the 20° piston position and correct it if necessary
- ▶ Check position of dust seal
- ▶ Lubricate contact surfaces on piston and brake caliper with Bosch Superfit

#### Please observe:

- Never use lubricants containing copper
- Lubrication of brake pads with an adhesive layer is not permitted



### 14. Resetting piston (brake caliper with locking mechanism)

- ▶ Reset the piston of the brake caliper with locking mechanism using the piston resetting device when under pressure and with a rotary motion as far as the stop
- ▶ Then back off approx. 1/4 – 1/2 rotation until the markings on the piston are aligned with the markings on the brake caliper housing
- ▶ Check position of dust seal
- ▶ Lubricate contact surfaces on piston and brake caliper with Bosch Superfit

#### Please observe:

- The parking brake must be released completely during resetting of the piston and the locking levers must be at the end stop
- For vehicles with electromechanical parking brake, the system must be in Service mode. This requires the use of a KTS





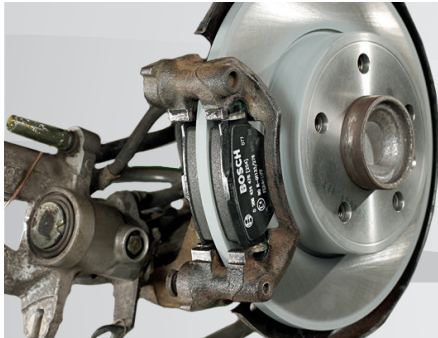
## Disc brake – Tips, tests and repair information



### 15. Assembly of brake pads

- ▶ Insert any necessary slide plates at brake caliper
- ▶ Lubricate guides of brake pads with Bosch Superfit or Bosch Superfit with brush

**Please observe:**  
Never use lubricants containing copper



### 16. Assembly of brake pads

- ▶ Insert brake pads in brake anchor plate
- ▶ Ensure installation position is correct, particularly with linings linked to a specific direction



### 17. Assembly of brake pads

- ▶ Only remove cover of adhesive layer directly prior to installation

**Please observe:**  
Never apply lubricants to the adhesive layer




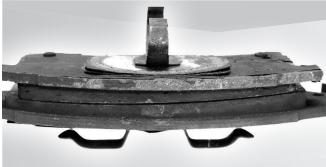


### Workshop tip

Assembly with lubricants containing copper can lead to resonant vibrations and/or make it more difficult for the brake pads to return smoothly once the brake is released. Both of these can result in noise (squealing).

**By using Bosch Superfit in the area of the brake pad guides and - depending on the caliper design - the brake caliper guides as well, such noises can be avoided and improved sliding properties of the brake pads can be achieved.**

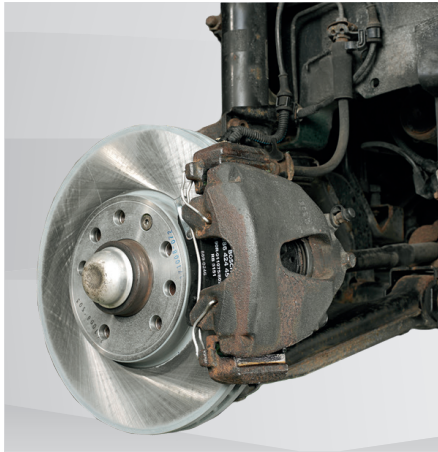


## Disc brake – Identifying and solving the most common problems

	Cause	Effect	Recommendation
<b>Wear on one side only</b> 	<ul style="list-style-type: none"> <li>▶ Brake caliper and/or brake caliper piston is blocked</li> <li>▶ Guiding of the caliper does not work properly</li> </ul>	<ul style="list-style-type: none"> <li>▶ Vehicle pulls to one side during braking</li> <li>▶ Faster and/or uneven brake pad wear</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the brake caliper and replace if necessary</li> <li>▶ Replace the brake pads</li> </ul>
<b>Conical wear – vertical or horizontal</b> 	<ul style="list-style-type: none"> <li>▶ Worn brake caliper seals and/or spring</li> <li>▶ Excessive operating clearance of the caliper</li> </ul>	<ul style="list-style-type: none"> <li>▶ Premature brake pad wear</li> <li>▶ Braking noise</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the brake caliper and replace if necessary</li> <li>▶ Replace the brake pads</li> </ul>
<b>Grooves and scoring in the friction material</b> 	<ul style="list-style-type: none"> <li>▶ Dust or metal particles on the contact surface of the brake pad or brake disc</li> <li>▶ Scratches on the surface of the brake disc</li> </ul>	<ul style="list-style-type: none"> <li>▶ Braking noise</li> <li>▶ Vibration during braking</li> <li>▶ Affected braking efficiency</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the brake disc and replace if necessary</li> <li>▶ Replace the brake pads</li> </ul>
<b>Cracks or broken edges in the friction material</b> 	<ul style="list-style-type: none"> <li>▶ Extreme heat buildup due to constant contact between the brake pad and brake disc</li> <li>▶ Bending of the brake pad backing plate</li> <li>▶ Brake caliper or brake caliper piston is blocked</li> </ul>	<ul style="list-style-type: none"> <li>▶ Braking noise</li> <li>▶ Vehicle pulls to one side during braking</li> <li>▶ Overheating on one wheel</li> <li>▶ Uneven brake pad wear</li> </ul>	<ul style="list-style-type: none"> <li>▶ Check the brake caliper and replace if necessary</li> <li>▶ Replace the brake pads</li> </ul>



## Disc brake – Tips, tests and repair information



### 18. Assembly of brake caliper, front axle

- ▶ Mount brake caliper on brake anchor plate, ensuring the position is correct
- ▶ Bolt on brake caliper guides
- ▶ Install brake caliper screws and tighten (specified torque)
- ▶ Replace accessory parts, springs, clamps, etc.
- ▶ After complete assembly, actuate brake pedal several times

#### Please observe:

- Depending on the vehicle, new screws must be used
- Old screws must be cleaned before they are reused

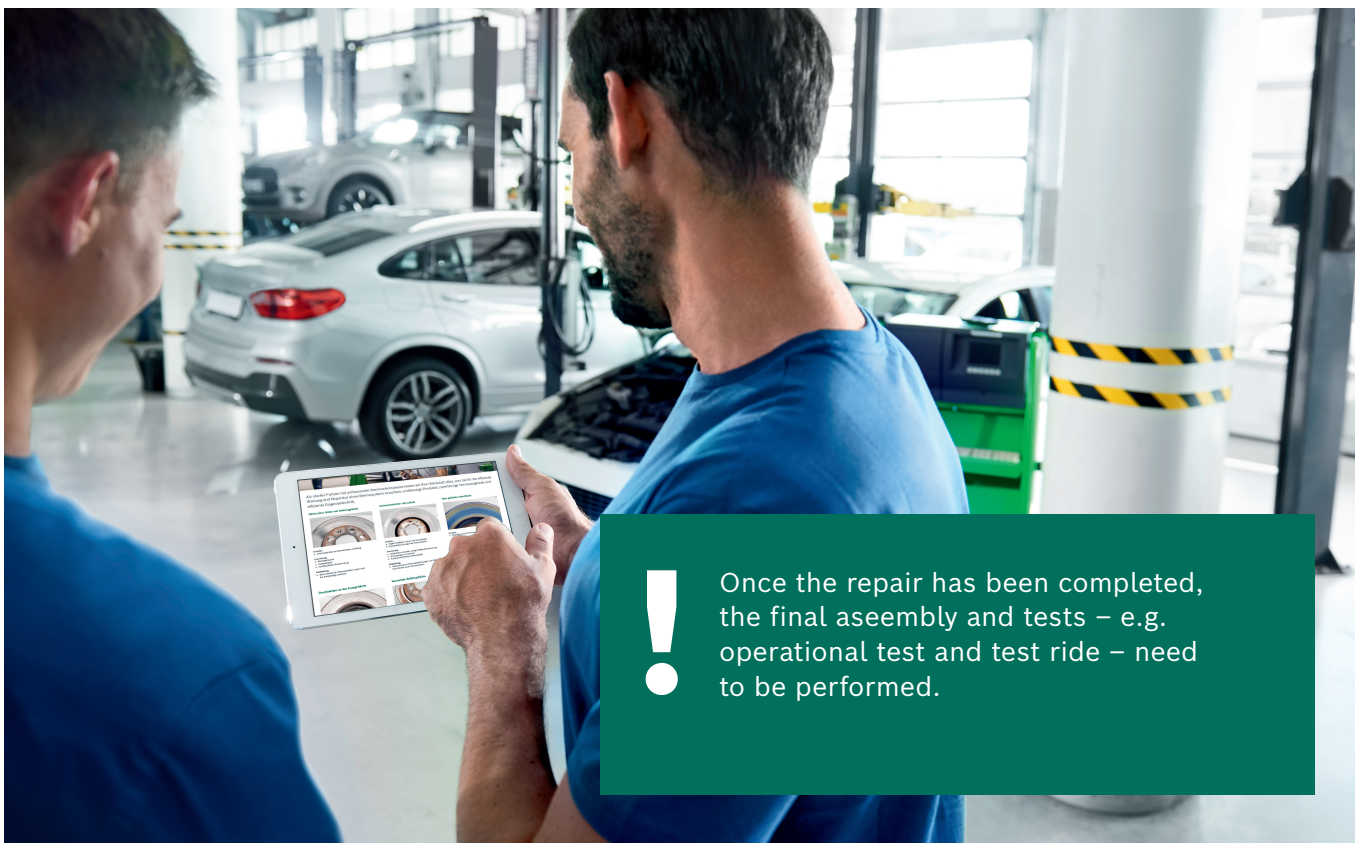


### 19. Assembly of brake caliper, rear axle

- ▶ Mount brake caliper on brake anchor plate, ensuring the position is correct. The lug on the lining back plate must lie in the piston recess
- ▶ Bolt on brake caliper guides, replace accessory parts, springs, clamps, etc.
- ▶ Install brake caliper screws and tighten (specified torque)
- ▶ After complete assembly, actuate brake pedal several times. Only then, attach hand-brake cables and make basic setting of parking brake system

#### Please observe:

- Depending on the vehicle, new screws must be used
- Old screws must be cleaned before they are reused



Once the repair has been completed, the final assembly and tests – e.g. operational test and test ride – need to be performed.

# Brake checklist

## 20 safety points

The following testing and control tasks consist of visual, functional and leak checks. They are supplemented by internal examinations and efficiency checks.

**Please observe:** This may require disassembly and assembly work. The description of disassembly and assembly work and further information is available in ESI[tronic].

Test	OK	not OK
	✓	✗
<b>1. Efficiency test on brake tester</b> Brake forces / deviation of brake forces / determination of brake factor / observance of specified values. <b>For further information, see ESI[tronic]</b>		
<b>2. Test drive</b> Noises / pulsating brake pedal / torsional vibration at steering wheel / steering wheel not in center position / vehicle pulls to left or right		
<b>3. Wheel bearings</b> Condition, rolling noises / tilting tolerance / axial clearance / security		
<b>4. Wheel suspension</b> Supporting and guiding joints / wheel hub / wheel securing system		
<b>5. Axles, suspension, steering</b> Spring strut / shock absorber / suspension springs / axle guide / rubber mounting / steering		
<b>6. Tires / rims</b> Tread depth / wear / pressure / wheel balancing / suitability for the vehicle / damage		
<b>7. Actuation device for service brake</b> Pedal rubber / free play / actuating rod play / ease of movement of pedal shaft / brake light switch		
<b>8. Actuation device for parking brake system</b> Lever stroke / detent device / ease of movement / display lamp / actuation device with electromechanical FBA		
<b>9. Brake booster, non-return valve</b> External damage / securing elements / non-return valve / hose and pipelines / function and leakproofness of brake booster / non-return valve. <b>For further information, see ESI[tronic]</b>		
<b>10. Fluid reservoir</b> End cover / tank / securing element / warning switch		
<b>11. Brake fluid</b> Level / appearance / brake fluid change / moisture content / boiling point		
<b>12. Brake master cylinder</b> External damage / correct securing / line connections / leakproofness		
<b>13. ABS/TCS/ESP®/SBC – hydraulic unit</b> External damage / correct securing / line connections / covers, function <b>Please observe: For the replacement, hydraulic and electric tests might be required!</b>		
<b>14. Brake pipes, brake hoses</b> External damage / correct securing / corrosion / installation, not twisted / age		
<b>15. Brake force regulator, brake force limiter</b> External damage / correct securing / line connections / linkage, lever / travel spring / function. <b>For further information, see ESI[tronic]</b>		
<b>16. Brake caliper</b> External damage / correct securing / bleed valve / dust caps / brake pad channels / guide elements / ease of movement of pistons / dust seal / basic setting		
<b>17. Disc-brake pad</b> Brake pad thickness (*) damage / cracks / shining / installation position / brake pad guides / slide plates <b>Important: (*) Wear limit at 4 mm pad thickness, measured without pad backing plate</b>		
<b>18. Brake disc, brake drum</b> Wear dimension / damage / crack formation / corrosion / lateral runout / thickness tolerance / radial runout		
<b>19. Drum brake</b> Brake anchor plate / wheel brake cylinder / parking brake lever / adjuster / brake shoes / brake pads / return springs / basic setting		
<b>20. Brake cables, brake linkage</b> External damage / securing elements / correct installation / breakages		



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