
BRAKE SYSTEM

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23.1 FRONT BRAKE

1 Warning and Precaution

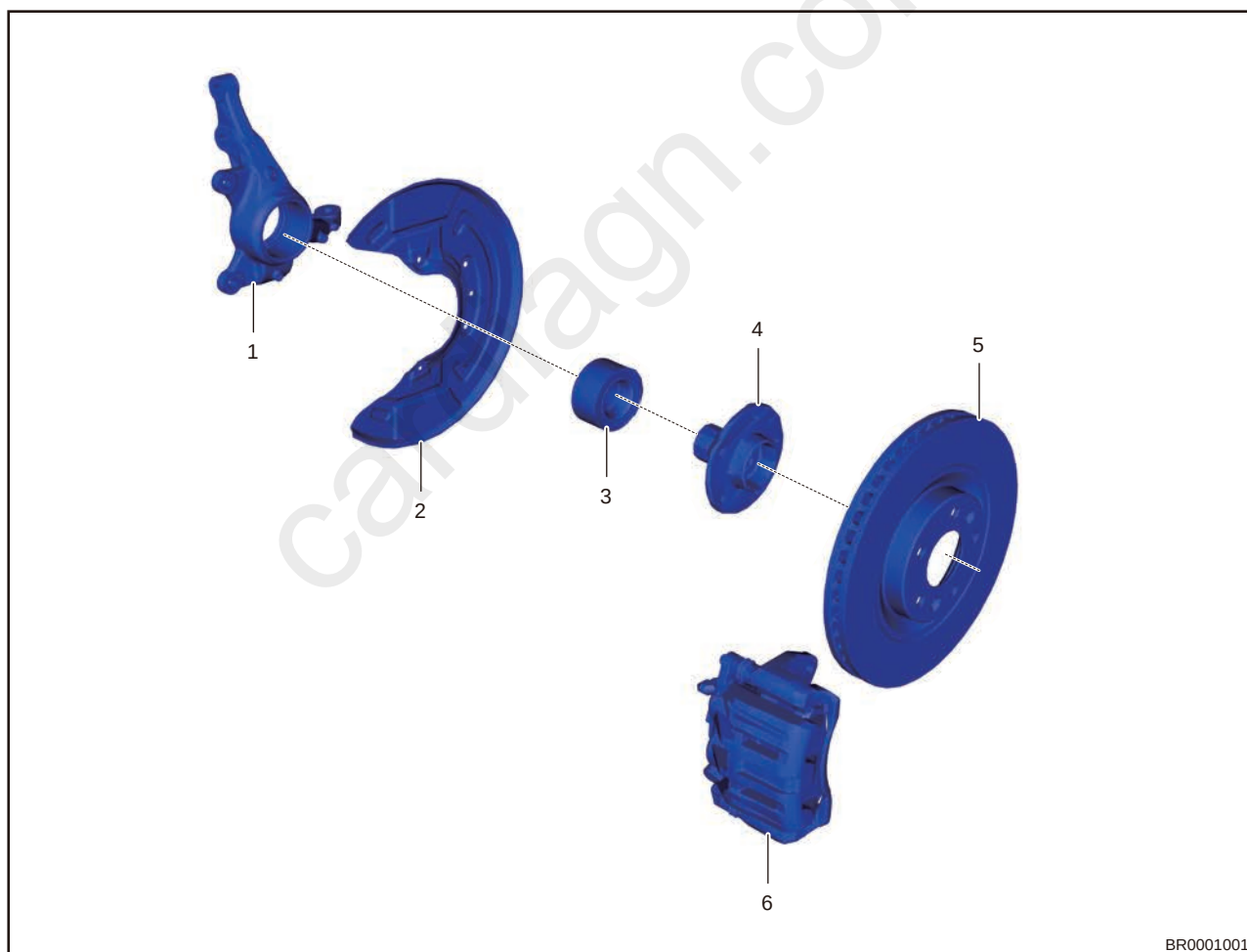
1.1 Precaution

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

- (1) DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.
- (2) After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- (3) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

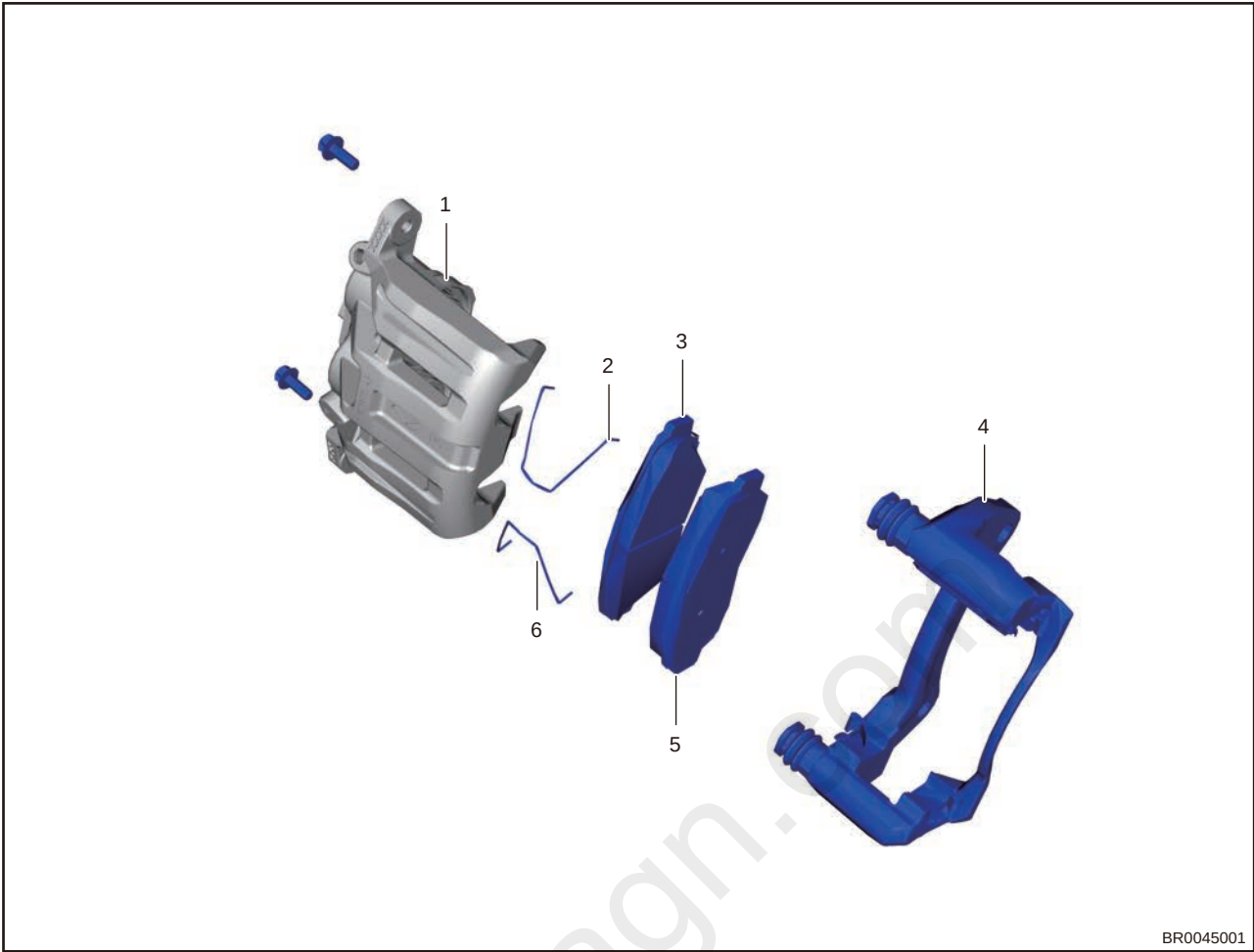
2 System Overview

2.1 System Components Diagram



BR0001001

1	Front Left Steering Knuckle	4	Front Hub
2	Front Left Dust Guard	5	Front Left Brake Disc
3	Front Hub Bearing Assembly	6	Front Left Brake Caliper



1	Front Left Brake Caliper	4	Front Left Brake Caliper Bracket
2	Spring Plate	5	Front Left Outer Brake Lining
3	Front Left Inner Brake Lining	6	Spring Plate

2.2 Brake Disc Specifications

■ Front Disc Brake

Description	Minimum Thickness (mm)
Front Brake Disc	26
Front Brake Lining	2

3 DIAGNOSIS & TESTING

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

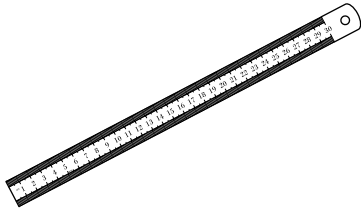
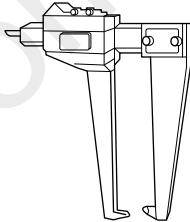
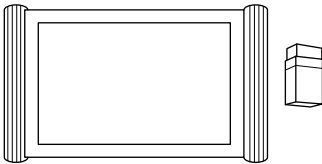
Symptom	Suspected Area
Brake shakes	Brake disc thickness is out of limit thickness
	Hub bearing is damaged or worn

Symptom	Suspected Area
	Brake assembly bolt becomes loose
	Steering/suspension part is loose or worn
	Tire dynamic balance is incorrect
	Four-wheel alignment is incorrect
	ABS operates abnormally
Abnormal noise occurs on bumpy road	Spring plate is worn or deformed
	Brake assembly bolt becomes loose
	Abnormal noise is caused by slight axial movement of brake caliper on bumpy road
	Steering/suspension part becomes loose or shock absorber is worn
Wheel dragging	Residual pressure in brake system
	Bearing is damaged
	Large sliding resistance of brake caliper
	Guide pin is deformed
	Guide pin is not installed in place
	Guide pin dust boot is damaged
	Linings are not installed correctly
	Chassis interference part
Brake noise	Metal scratching occurs during braking
	Continuous “squeak” sound occurs for a longer time during braking
	A clear “click” sound occurs at the beginning of braking
	Relevant bolts are loose
	Relevant parts are damaged

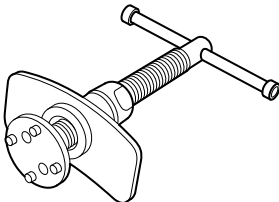
4 ON-VEHICLE SERVICE

4.1 Tools

■ General Tool

Tool Name	Tool Drawing
Caliper	 S00044
Thickness Measurement Caliper	 S00082
Diagnostic Tester	 S00001

■ Special Tool

Tool Name	Part No.	Tool Drawing
Brake Cylinder Release Tool	ECH-0005	 S00076

4.2 Brake Bleeding

Hint:

- Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
- An assistant will be required to assist when bleeding brake system.
- There are 2 methods for brake bleeding, and specific operation procedures are as follows:

■ Manual Bleeding

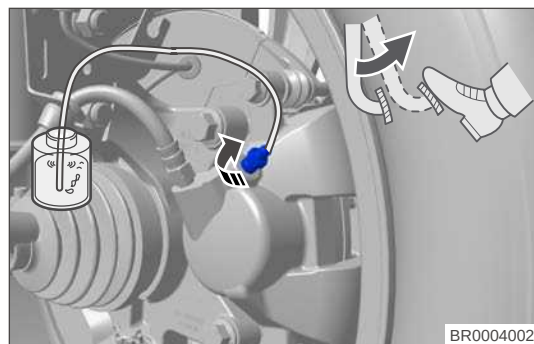
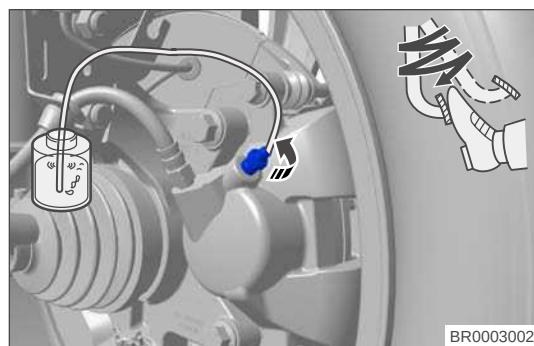
⚠ Caution

- When performing bleeding procedures for brake system, wear safety glasses.
- Be careful when bleeding air, as brake fluid at high pressure may spray out from bleeder screw.

⚠ Warning

- Before removing brake fluid reservoir, wipe off any dust and other foreign matters on brake fluid reservoir to prevent them from entering.
- Use fresh, clear and well-sealed brake fluid with specified type.
- DO NOT allow the brake fluid to adhere to any paint surface, such as vehicle body. If brake fluid leaks onto any paint surface, immediately wash it off.
- During bleeding, do not depress brake pedal repeatedly at any time with bleeder screw opened. Otherwise, air amount in the system will increase to make an extra bleeding.
- DO NOT drain the brake fluid in brake fluid reservoir while bleeding brake system.

- (1) Fill brake fluid reservoir with brake fluid to a proper level.
- (2) Loosen bleeder screw cap and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.
- (3) Have an assistant depress brake pedal 3 to 4 times repeatedly; and depress and hold it at a lower position, then loosen the bleeder screw.
- (4) Tighten bleeder screw every time brake pedal goes down quickly, then release the brake pedal.

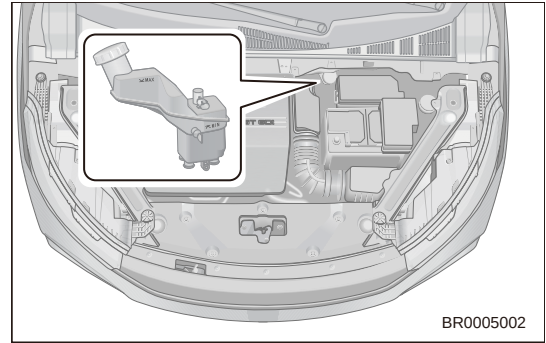


- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

Empty sign: A stream of fresh brake fluid flows into clear container without bubbles.

Hint:

During bleeding of brake system, make sure brake fluid level in brake fluid reservoir is always near "MAX" mark. Check brake fluid level at all times during bleeding. Add brake fluid as necessary.



- (6) Check and adjust the brake fluid level to "MAX" mark.
- (7) Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.
- (8) Test vehicle to confirm that brakes operate properly with good depressing feel.

■ **Bleeding brake using diagnostic tester**

Hint:

To reach sufficient pressure in hydraulic regulator, brake pedal needs to be depressed repeatedly during whole process.

Warning

- Check that battery voltage should not be less than 12 V.
- Bleeding order must be rear left/front left/front right/rear right.
- If it is necessary to repeat part or whole bleeding procedure, be sure to wait for 5 minutes to cool solenoid valve down, otherwise solenoid valve may be damaged due to overheat.
- During bleeding, do not depress brake pedal repeatedly at any time with bleeder screw opened. Otherwise, air amount in the system will increase to make an extra bleeding.
- Depress brake pedal repeatedly with a frequency of 0.5 times per second in the whole bleeding process.

- (1) Fill brake fluid reservoir with brake fluid to a proper level.
- (2) Depress brake pedal more than 20 times with engine stopped.
- (3) Turn ENGINE START STOP switch to "ON", and connect the diagnostic tester.
- 1) Click "ESP (iEPB) Electronic Stability Control Module (Integration Electric Parking Brake)".
 - 2) Click "Special Function".

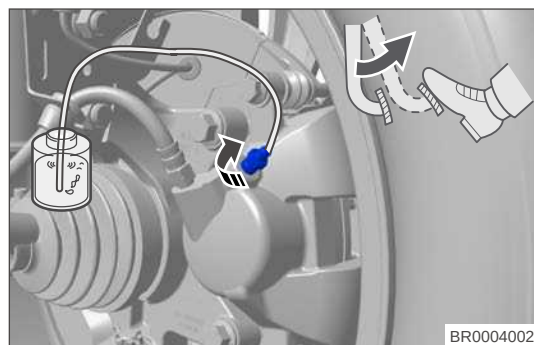
- 3) Click “Manual Bleeding” .

Show Menu	
EXEED V10.61 > New TXL > System Selection > ESP(IEPB)(Electronic Stability Program (Integration Electrical Park Brake))	
Write VIN Code	Write Electronic Stability Program (Integration Electrical Park Brake) (ESP (IEPB)) Configuration Data
EPB Assembly Check, Brake Caliper Check	EPB Maintenance Mode (Replace Brake Pad)
Manual Bleeding (Include Evacuation Filling Byte Writing)	

Exeed New TXL

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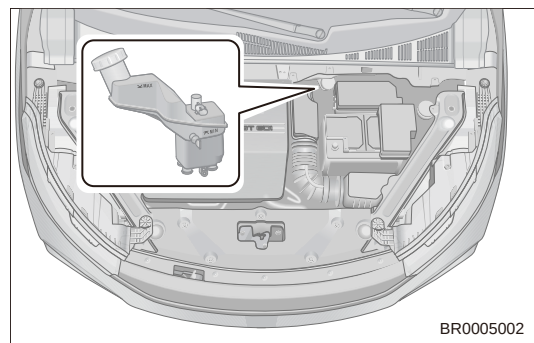
- 4) Click OK, please select [Phase 1: Bleed the wheel rear left] on Diagnostic program screen, then perform bleeding operation for rear left wheel.
- (4) Tighten bleeder screw every time brake pedal goes down quickly, then release the brake pedal.



- (5) Repeat above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.
- Empty sign: A stream of fresh brake fluid flows into clear container without bubbles.

Hint:

During bleeding of brake system, make sure brake fluid level in brake fluid reservoir is always near “MAX” mark. Check brake fluid level at all times during bleeding. Add brake fluid as necessary.



- (6) Check and adjust the brake fluid level to “MAX” mark.
- (7) Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.
- (8) Test vehicle to confirm that brakes operate properly with good depressing feel.

4.3 Replace Front Disc Brake Assembly

■ On-vehicle Inspection

⚠ Caution

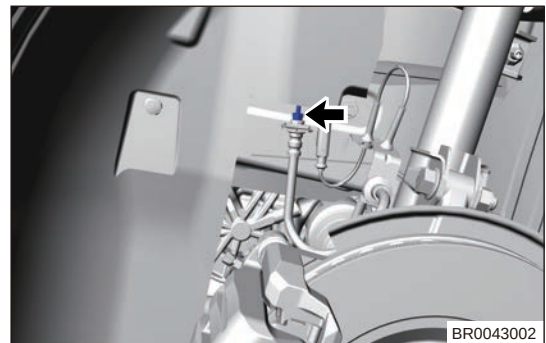
- Use well-sealed DOT4 brake fluid specified by EXEED. DO NOT use oily solution, otherwise brake system seal may be damaged.
- Brake fluid may damage paint surface. If brake fluid spills on paint surface, wash it off immediately with water.
- DO NOT use gasoline, kerosene, alcohol, engine oil, transmission oil or any other fluid that contains mineral oil to clean the system components. These kinds of fluid will damage the rubber cover and seal.
- During servicing, be sure to clean the grease or other foreign matter on the outer surface of brake caliper assembly, brake lining, brake disc and wheel hub.
- When operating brake disc and brake caliper, be careful not to damage brake disc and brake caliper and scratch or cut brake shoe linings.

- (1) Check conditions of tires and wheels. Damaged or worn wheels and tires can cause a pull, shudder, vibration and a condition similar to sudden braking.
- (2) If noise occurs while braking, check suspension components. Bounce the vehicle up and down several times and check suspension or steering components for any looseness, wear or damage.
- (3) Check brake fluid level and condition.
 - If brake fluid level is low, check ESP (iEPB) control unit assembly, brake caliper, brake line, brake master cylinder assembly and brake fluid reservoir, etc. for leakage.
 - If brake fluid is contaminated, drain a certain amount of fluid for inspection. Replace with new fluid as necessary.

■ Removal

Hint:

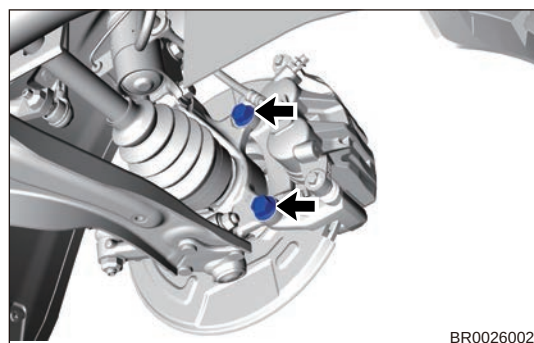
- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
- (1) Remove the front left wheel.
 - (2) Loosen coupling nut (arrow) between front left brake hose assembly and front left brake pipe.



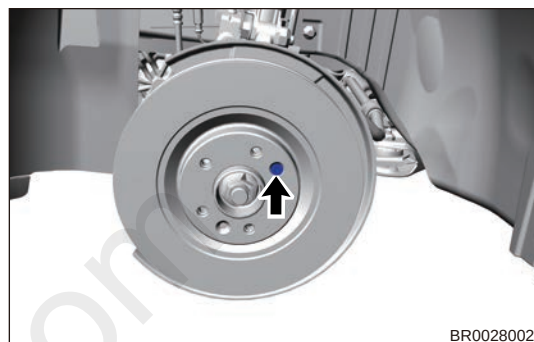
⚠ Caution

- DO NOT allow any foreign matter such as dirt and dust to enter brake pipe from joint parts.
- After removing brake line, perform sealing treatment to prevent foreign matter from entering.

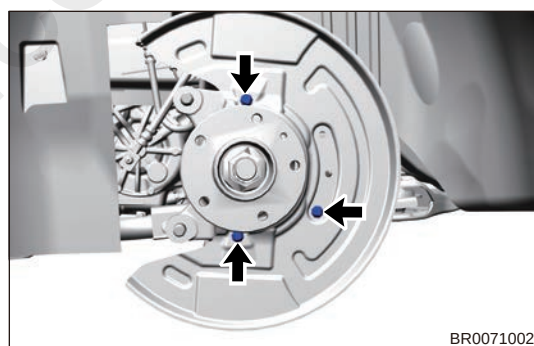
- (3) Remove 2 coupling bolts (arrow) between front left brake caliper assembly and front left steering knuckle.



- (4) Remove the fixing screws (arrow) from front left brake disc, and remove front left brake disc.



- (5) Remove 3 fixing bolts (arrow) between front left brake disc baffle plate and steering knuckle.



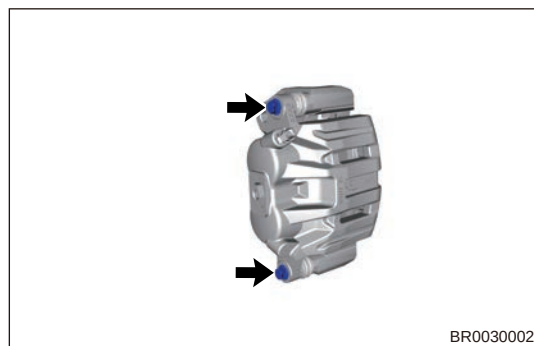
- (6) Remove the front left brake baffle plate.

■ Disassembly

Hint:

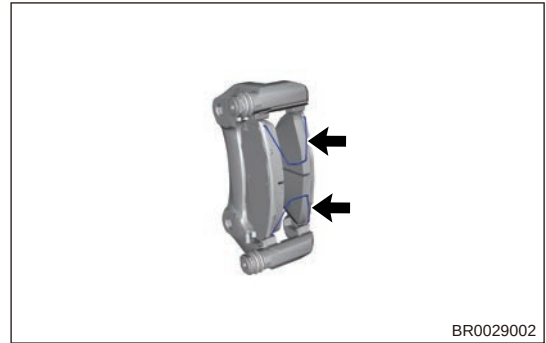
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

- (1) Remove 2 guide bolts (arrow) between brake caliper fixing bracket and brake cylinder assembly.

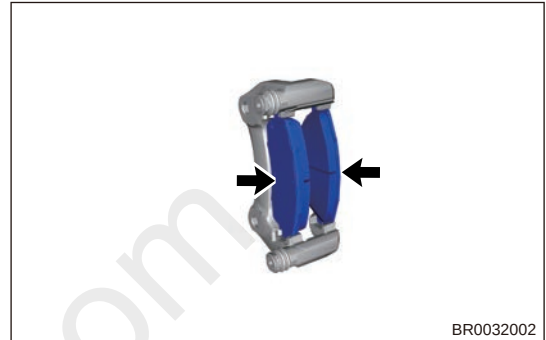


- (2) Separate brake cylinder assembly from brake caliper fixing bracket.

- (3) Remove 2 spring plate (arrow) from brake lining.



- (4) Remove inner and outer brake linings (arrow) from brake caliper fixing bracket.



■ Inspection

- (1) Check brake caliper fixing bracket and brake caliper guide pin set.
 - Clean the contact surfaces of brake caliper fixing bracket and brake lining support shims with brake cleaner. Check for deformation, cracks, rust and foreign matter which is difficult to remove.
 - Check brake caliper guide pin rubber dust boot for deformation, cracks, wear and foreign matter which is difficult to remove.
 - Install the brake caliper guide pin and its rubber dust boot to brake caliper fixing bracket. Brake caliper guide pin set should move smoothly without sticking when pushing it with hand; otherwise replace it.
 - After installing the brake lining, check if it is easy to drop (due to insufficient elasticity of support shim). Replace as necessary.
- (2) Check the brake lining.
 - Visually check the brake lining for flatness, and also check for excessive wear. If the condition of lining cannot be confirmed accurately only by visual inspection, perform physical inspection as necessary.
 - Measure the minimum brake lining thickness. When the minimum thickness of brake lining is 2mm or less, replace the brake linings.
 - When replacing the excessively worn brake linings (inner and outer), it is also necessary to replace the linings on opposite side of vehicle as well as unchecked linings to maintain proper braking performance. If it is unnecessary to replace brake linings, be sure to reinstall brake linings to original positions.
- (3) Check the brake disc.
 - Minor scratch or wear on brake disc surface is acceptable. If severe scratch or deformation exists, the brake disc must be replaced.
 - Excessive wear of brake disc may cause poor contact between brake lining and surface of brake disc. If protrusion on the disc is not removed before installing new brake lining, it will cause abnormal wear of brake disc.
 - It is normal that the surface of brake disc is worn when replacing brake lining. If cracks or burned spots exist, the brake disc must be replaced.
- (4) Check the brake disc thickness.
 - Check the brake disc thickness.

- Minimum thickness: 26 mm
- If it is less than the minimum thickness due to wear, replace brake disc.

⚠ Caution

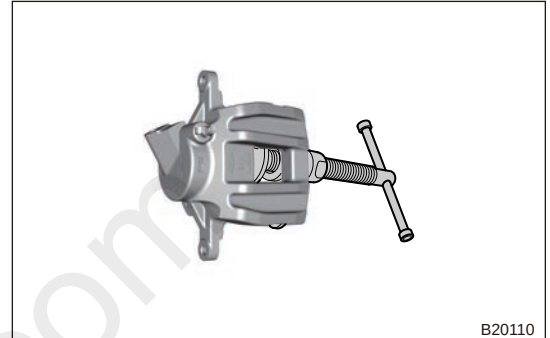
- **DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.**

■ Assembly

⚠ Caution

- **Be sure to tighten fixing bolts to specified torques during assembly.**

- (1) Using brake cylinder release tool, slightly retract brake caliper piston.



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- (2) Install inner and outer brake linings.
- (3) Install 2 front spring plates.
- (4) Install 2 guide bolts between brake caliper fixing bracket and brake cylinder assembly.

Torque: 30 - 35 N·m

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torque.**
- **Be sure to add brake fluid to a proper level after installation.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**

- (1) Install the front left brake baffle plate to a proper position.
- (2) Install 3 fixing bolts between front left brake disc baffle plate and steering knuckle.
- (3) Install the front left brake disc to a proper position.
- (4) Install the fixing screws on the front left brake disc.

Torque: 7- 9 N·m

- (5) Install the front left brake caliper assembly to a proper position.
- (6) Install 2 coupling bolts between front left brake caliper assembly and front left steering knuckle.

Torque: 81 - 93 N·m

- (7) Install the coupling nut between front left brake hose assembly and front left brake pipe.

Torque: 18 ± 2 N·m

- (8) Install the front left wheel.
- (9) Connect the negative battery cable.