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Front Disc Brake -

General Specification

Item	Specification
Front disc	Ventilated
Front disc diameter:	
3.2 Petrol	316 mm (12.4 in)
2.2 Diesel	300 mm (11.8 in)
Front disc thickness new (All engines)	28 mm (1.10 in)
Service limit (All engines)	26 mm (1.024 in)
Maximum disc run-out - disc installed	0.080 mm (0.003 in)
Pad minimum thickness	2 mm (0.078 in)
Piston diameter	60 mm (2.362 in)

Torque Specifications

Description	Nm	lb-ft
Brake caliper bleed screw	8	6
Brake caliper mounting plate to wheel knuckle bolts*	200	148
Brake caliper guide pin bolts	28	21
Brake disc dust shield bolts	10	7
Brake disc Torx screw	35	26
Brake flexi hose union to caliper	32	24
Brake hose retaining bracket to damper bolt	22	16

*** New nuts/bolts must be fitted**

Part Number

Front Disc Brake - Front Disc Brake

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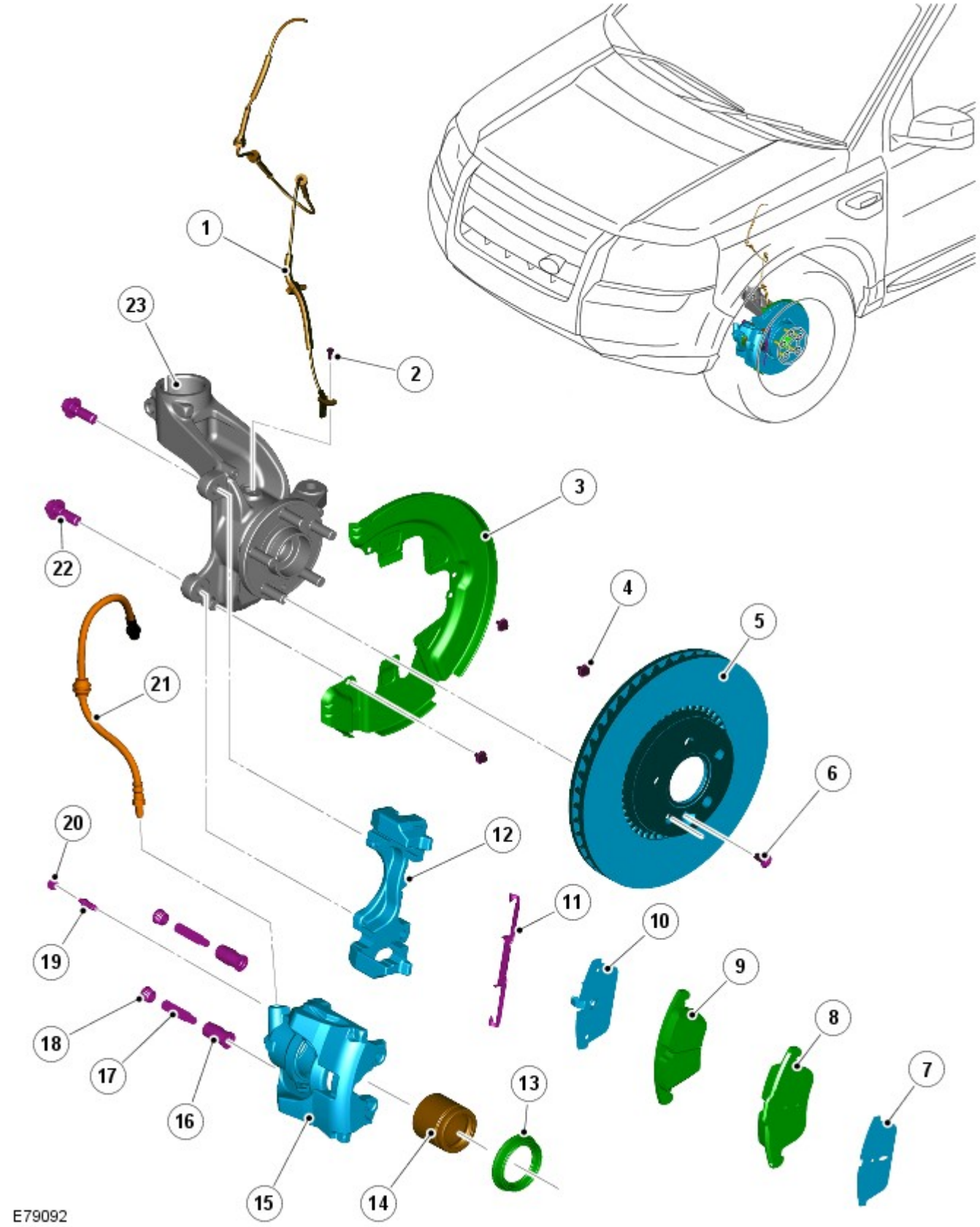
Description and Operation

COMPONENT LOCATION

NOTE: i6 gasoline front disc brake shown; TD4 diesel front disc brake similar.



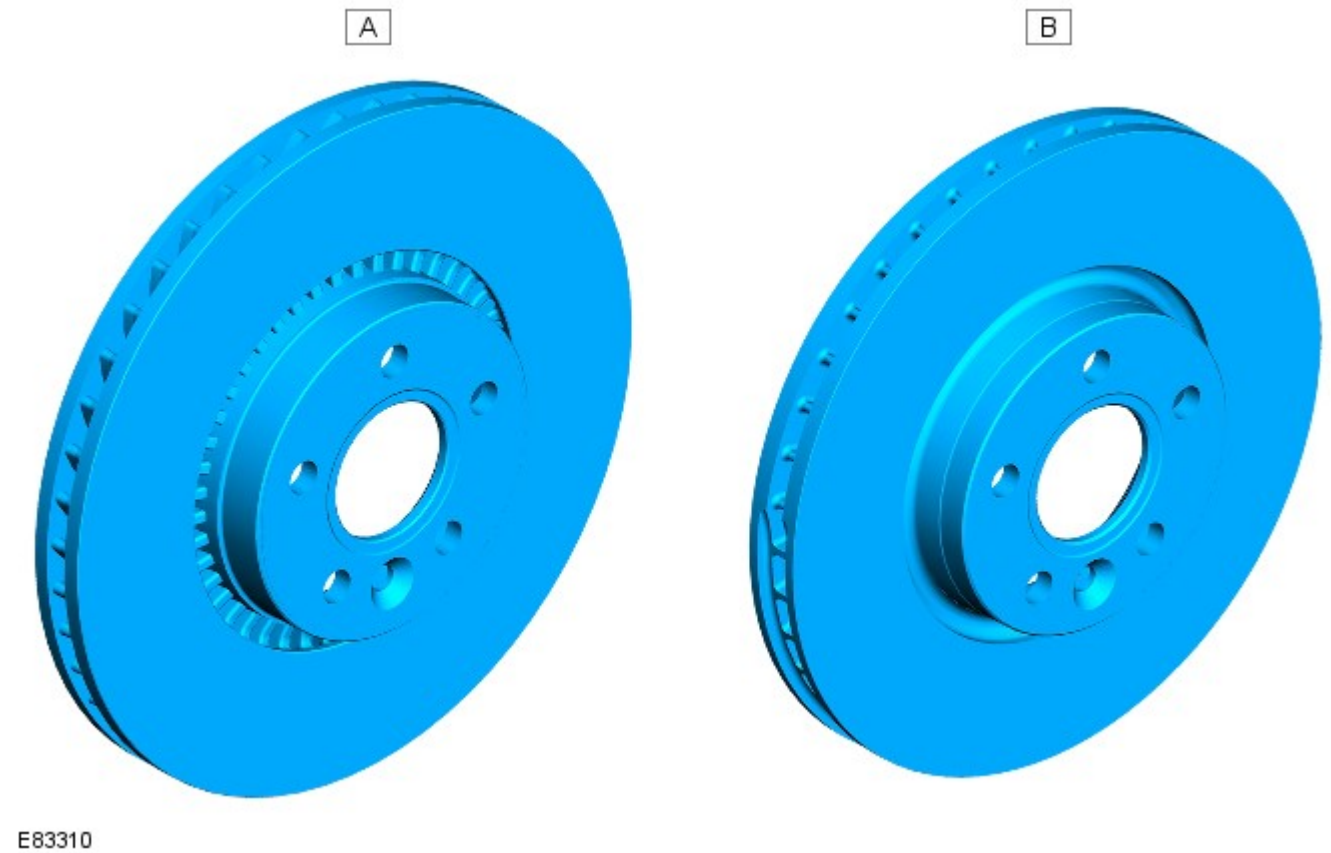
Item	Part Number	Description

1		Anti-lock Brake System (ABS) sensor cable
2		ABS sensor retaining screw
3		Dust shield
4		Dust shield retaining screw (3 off)
5		Brake disc
6		Brake disc retaining screw
7		Outer anti-squeal shim
8		Outer brake pad
9		Inner brake pad
10		Inner anti-squeal shim
11		Caliper housing spring
12		Fixed carrier
13		Caliper piston seal
14		Caliper piston
15		Sliding caliper
16		Bushed bolt rubber boot (2 off)
17		Bushed bolt (2 off)
18		Bushed bolt dust cap (2 off)
19		Caliper bleed screw
20		Bleed screw cap
21		Flexible hose
22		Fixed carrier retaining bolt (2 off)
23		Front Left-Hand (LH) wheel knuckle

OVERVIEW

The front brake assembly features a ventilated brake disc and cast-iron sliding caliper with single acting piston.

BRAKE DISC



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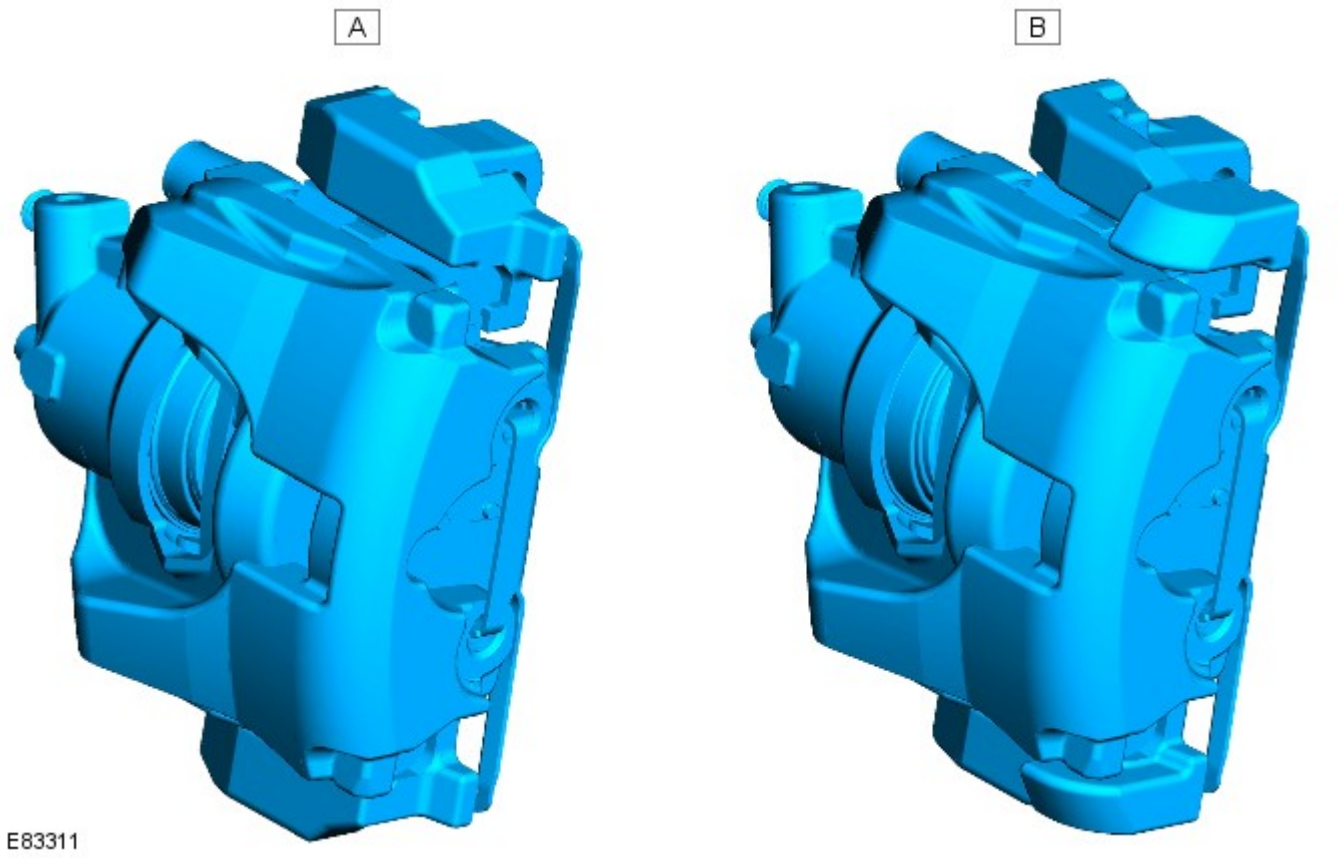
Item		Description
A		Front brake disc - i6 gasoline vehicle
B		Front brake disc - TD4 diesel vehicle

The brake disc installed to the 3.2 liter i6 gasoline vehicle is 316 x 28 mm (12.44 x 1.10 in) diameter. The brake disc installed to the 2.2 liter TD4 diesel vehicle is 300 x 28 mm (11.81 x 1.10 in) diameter. The brake disc is secured to the wheel knuckle hub with a single screw and is also retained by the 5 wheel securing nuts.

Both types of front brake disc are manufactured with ventilation channels, allowing the disc to achieve high levels of thermal stability even during severe braking.

The disc is cooled as the forward motion of the vehicle draws air through the ventilation channels, and across the surfaces of the disc.

CALIPER ASSEMBLY



Item		Description
A		Front brake caliper - i6 gasoline vehicle
B		Front brake caliper - TD4 diesel vehicle

The caliper assembly comprises a fixed carrier and sliding caliper. The fixed carrier is mounted to straddle the brake disc and is attached to the wheel knuckle with 2 bolts. The fixed carrier provides the location for 2 brake pads that are mounted on either side of the brake disc, and is formed with guide channels that allow the brake pads to slide toward the disc surface.

NOTE: The 2 fixed carrier retaining bolts are pre-applied with a thread locking adhesive and must not be re-used during maintenance. New fixed carrier retaining bolts must be used and the original bolts discarded.

The sliding caliper is mounted over the fixed carrier and retains the 2 brake pads within the caliper assembly. The sliding caliper is secured to the fixed carrier with 2 bushed bolts, and is formed with a hydraulic chamber containing a 60 mm (2.36 in) diameter piston and annular seal.

The sliding caliper is connected via a flexible hose to the brake system hydraulic circuit, and also incorporates a bleed screw for maintenance purposes.

The 2 bushed bolts are machined with a smooth surface and are protected from dirt and moisture ingress with a collapsible rubber boot. The bushed bolts allow the sliding caliper limited lateral movement along the fixed carrier.

A housing spring is located on the outer side of the brake disc, and is connected with formed hooks between the fixed carrier and sliding caliper. During operation of the brake, the spring is tensioned as the sliding caliper moves toward the brake disc. The spring assists to move the sliding caliper away from the brake disc as the brake is released.

An anti-squeal shim is installed on the outside edge of each brake pad and reduces Noise, Vibration and Harshness (NVH)

from the brake components during operation.

The brake pads are not installed with pad wear sensors.

BRAKE DUST SHIELD

A formed brake dust shield is located between the wheel knuckle and brake disc, and is secured to the knuckle with 3 screws.

The brake dust shield is handed to the relevant side of the vehicle and protects the brake components from cross axle stone throws. The brake dust shield also prevents debris and brake dust from spreading to other parts of the vehicle.

PRINCIPLES OF OPERATION

Brake Application

As the brake pedal is applied, initial hydraulic pressure is felt in the sliding caliper chamber causing the piston to extend toward the brake disc. The moving piston contacts the inner brake pad, forcing the pad along the fixed carrier guide channels and into contact with the inner side of the brake disc.

As the piston extends from the caliper chamber, it passes through an internal annular seal located within the caliper chamber. The movement of the piston distorts the shape of the seal and consequently, the seal applies pressure on the piston outer surface.

The sliding caliper now reacts and commences to slide along the 2 bushed bolts, in the opposite direction to the extending piston. The sliding caliper contacts the outer brake pad, forcing the pad along the fixed carrier guide channels and into contact with the outer side of the brake disc. The housing spring that is attached between the fixed carrier and sliding caliper is tensioned as the sliding caliper moves toward the brake disc.

With both brake pads now in full contact with the brake disc and hydraulic pressure acting on the piston, no further movement of the piston and sliding caliper is possible. The force created by the piston and caliper acting against the brake pads increases rapidly, trapping the brake disc and slowing the vehicle.

Brake Release

As the brake pedal is released, hydraulic pressure in the caliper chamber collapses and force is no longer applied to the brake pads. The brake pads are moved slightly outwards by the action of the rotating brake disc, and the caliper internal annular seal returns to the normal shape. As the seal moves it grips on the piston outer surface and withdraws the piston into the chamber, sufficiently to provide the necessary pad to disc clearance.

This action prevents the piston from holding the inner brake pad against the disc, and also enables the piston to protrude further from the caliper chamber to compensate for brake pad wear.

With no pressure being applied to the hydraulic system, the housing spring tension is also relieved and the spring returns to the normal position. As the housing spring moves, the attached sliding caliper is moved away from the outer side of the disc to provide the necessary clearance between the outer brake pad and the brake disc.

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Front Disc Brake - Front Disc Brake

Diagnosis and Testing

For additional information.
REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).

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Front Disc Brake - Brake Pads

Removal and Installation

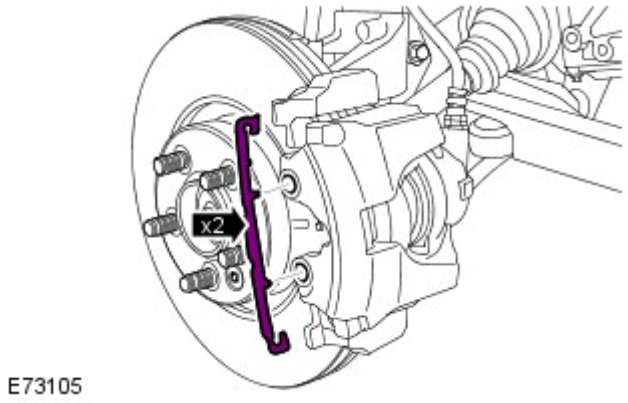
Removal

1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the front wheels and tires.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).



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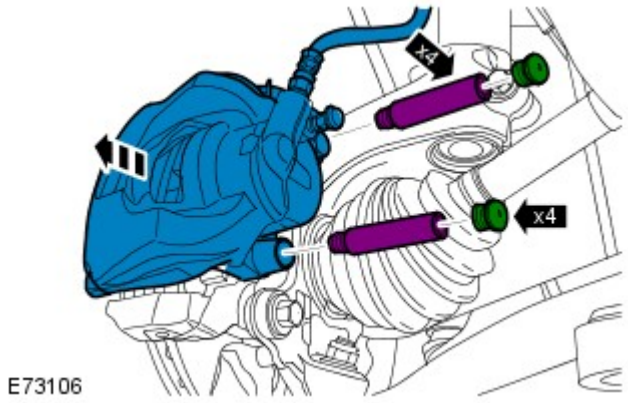
3. Remove the brake pad spring clip.



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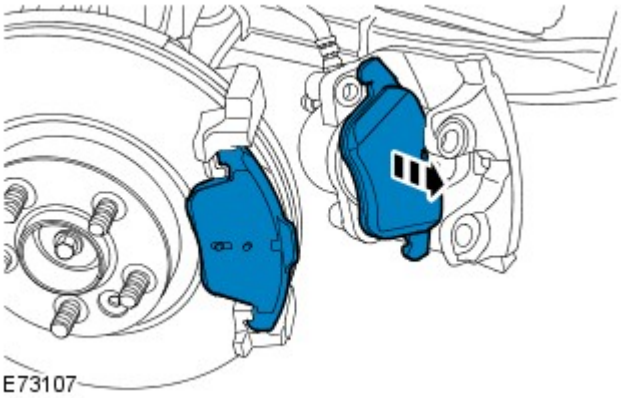
4. Remove the 2 caliper guide pins.

5. CAUTION: Make sure that no load is placed on the brake hose.

   Release the brake caliper.



6. Remove the brake pads.

7. Repeat the above procedure for the other side.

Installation

1. WARNING: Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.

   CAUTION: Make sure that the mating faces are clean and free of foreign material and that no grease is applied to the brake pad guides.

   Clean the brake caliper housing and anchor plate using brake cleaning fluid.

2. Inspect the caliper piston and slide pin seals for damage.

3. Position a bleed jar containing a small quantity of approved brake fluid. Connect the bleed tube to the bleed screw and loosen the screw.

4. Press the piston into the caliper housing and tighten the bleed screw.

   Torque: 8 Nm

5. Disconnect the bleed tube and remove the jar.

6. Install the brake pads.

7. Install the brake caliper.

8. CAUTION: Make sure that the brake hose is not twisted and is correctly located.

   Install the guide pins and tighten.

   Torque: 28 Nm

9. Install the brake pad spring clip.

10. Repeat the above procedure for the other side.

11. Install the front wheels and tires.

Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

12. Depress the brake pedal several times, check the fluid level in the brake fluid reservoir and top-up with brake fluid if necessary.

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Front Disc Brake - Brake Disc

Removal and Installation

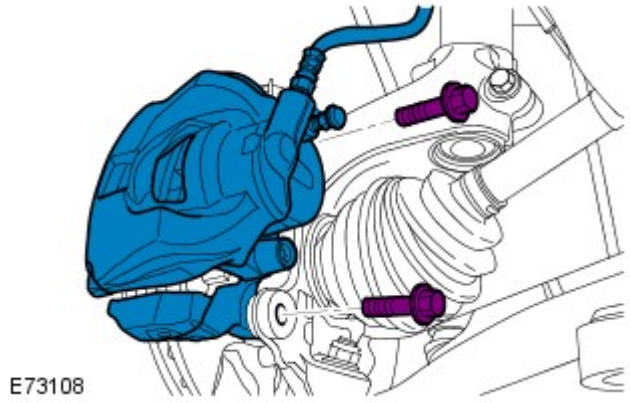
Removal

1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

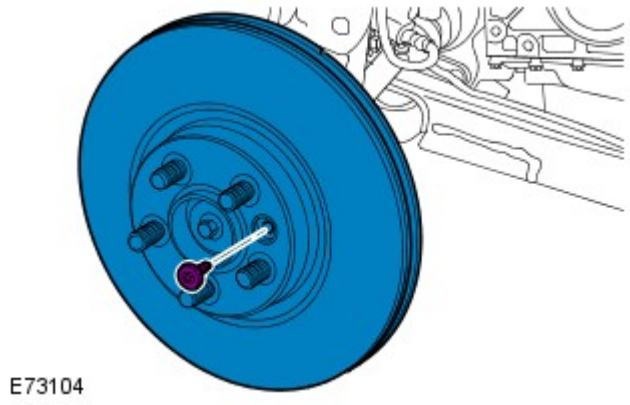
2. Remove the front wheel.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).



3. CAUTION: Make sure that no load is placed on the brake hose.

   Release the brake caliper and tie aside.



4. Remove the brake disc.

Installation

1. Make sure the brake disc and hub mating surfaces are clean.

2. Install the brake disc and tighten the Torx screw.

   Torque: 35 Nm

3. WARNING: Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.

   Clean the brake caliper housing and anchor plate using brake cleaning fluid.

4.  CAUTION: Make sure that the brake hose is not twisted and is correctly located.

   Install the brake caliper and tighten the new bolts.

   Torque: 200 Nm

5. Install the front wheel.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

6. Depress the brake pedal several times, check the fluid level in the brake fluid reservoir and top-up with brake fluid if necessary.

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Front Disc Brake - Brake Caliper Anchor Plate

Removal and Installation

Removal

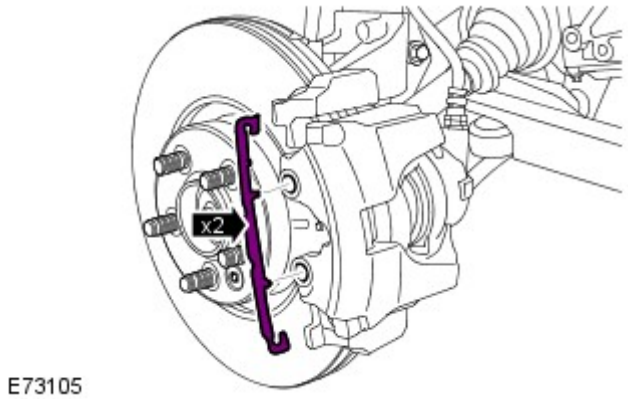
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the front wheel and tire.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3.



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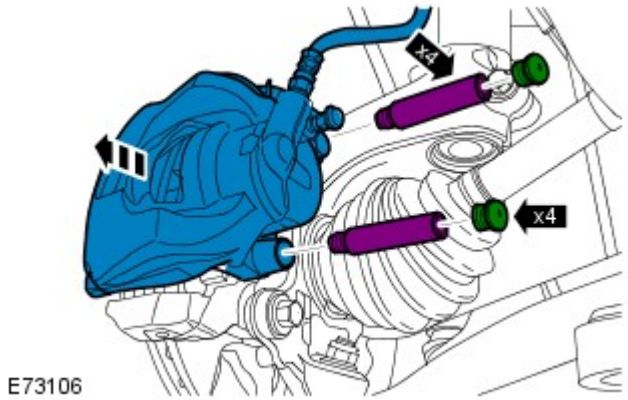
4. *Torque:* 28 Nm



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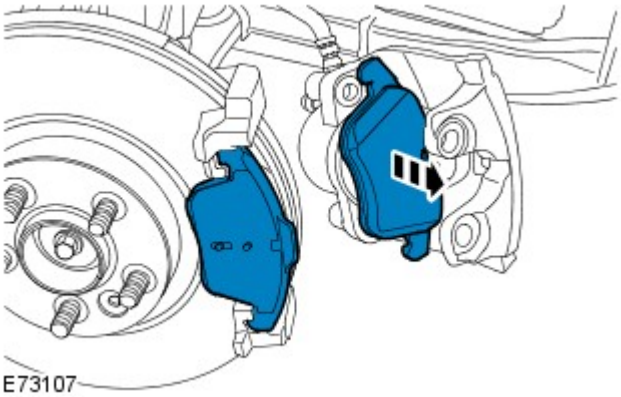
5. CAUTION: Do not allow the brake caliper to hang on the brake hose.

   Release the brake caliper.



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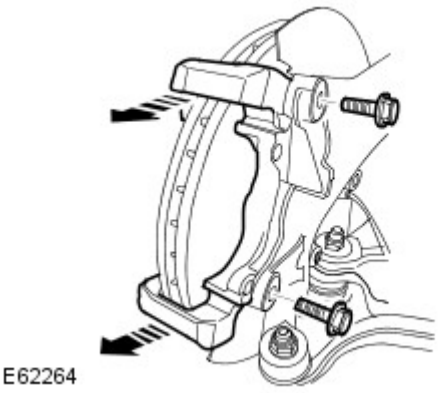

7. CAUTION: Make sure that new bolts are installed.

Torque: 200 Nm

Installation

1. CAUTION: Make sure that the brake hose is not twisted and is correctly located.

To install, reverse the removal procedure.