

2021 BRAKES

Disc Brake System - Canyon, Colorado

SPECIFICATIONS

FASTENER SPECIFICATIONS

Single Use Non-Threaded Fasteners/Components

NOTE: <i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Application	
Front Brake Hose Washer	
Rear Brake Hose Fitting Gasket	

Reusable Threaded Fastener Tightening Specifications

NOTE: <i>All fasteners listed in this table can be reused after removal.</i>	
Application	Specification
	Metric (English)
Front Brake Caliper Bleeder Valve	11 N.m (97 lb in)
Front Brake Caliper Bolt	180 N.m (133 lb ft)
Front Brake Caliper Guide Pin Bolt	37 N.m (27 lb ft)
Front Brake Rotor Bolt	9 N.m (80 lb in)
Rear Brake Bleeder Valve	17 N.m (13 lb ft)
Rear Brake Caliper Bracket Bolt	
• First Pass:	100 N.m (74 lb ft)
• Final Pass:	15-30 Degrees
Rear Brake Caliper Guide Pin Bolt	40 N.m (30 lb ft)
Rear Brake Rotor Bolt	9 N.m (80 lb in)

DISC BRAKE COMPONENT SPECIFICATIONS

Application	Specification	
	Metric	English
Front Brakes		
• Brake Rotor Diameter	310.0 mm	12.20 in
• Brake Rotor Discard Thickness*	25.0 mm	0.98 in

Application	Specification	
	Metric	English
• Brake Rotor Maximum Allowable Assembled Lateral Runout	0.05 mm	0.002 in
• Brake Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Brake Rotor Maximum Allowable Thickness Variation	0.006 mm	0.00024 in
• Brake Rotor Thickness New	27.0 mm	1.07 in

NOTE:

GM does NOT recommend any resurfacing of the park brake portion of the rear brake rotor. If light sanding will not remove the surface imperfections (rust/corrosion/pitting), the rotor should be replaced.

Rear Brakes

• Brake Rotor Diameter	324.0 mm	12.76 in
• Brake Rotor Discard Thickness*	16.5 mm	0.650 in
• Brake Rotor Maximum Allowable Assembled Lateral Runout	0.05 mm	0.002 in
• Brake Rotor Maximum Allowable Scoring	1.50 mm	0.059 in
• Brake Rotor Maximum Allowable Thickness Variation	0.006 mm	0.00024 in
• Brake Rotor Thickness- New	18.0 mm	0.709 in

*All brake rotors have a discard dimension cast into them. Replace any rotor that does not meet this specification. After refinishing the rotor, replace any rotor that does not meet the discard thickness specification.

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

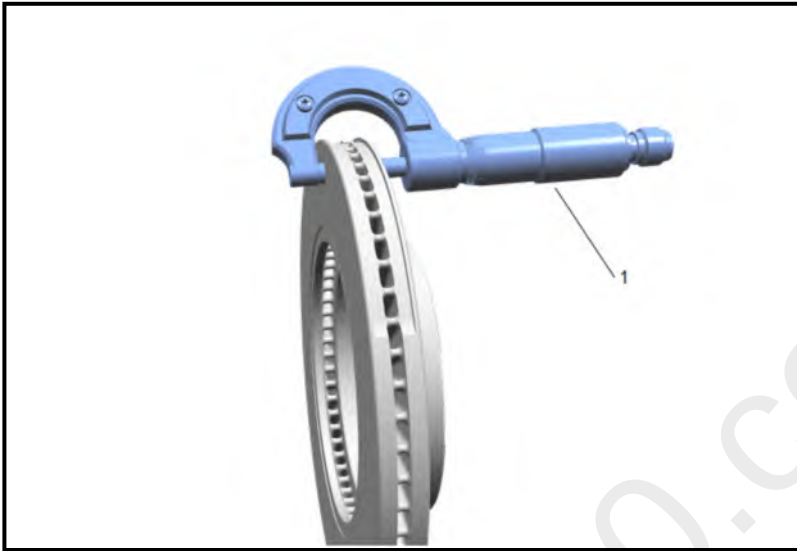
Application	Type of Material	GM Part Number
Brake Caliper Bolt	Thread locker	89021297 (Canada 10953488)
Front Disc Brake Pad	Anti-Seize and Lubricating Compound	19303310 (Canada 19303311)

DIAGNOSTIC INFORMATION AND PROCEDURES

BRAKE ROTOR THICKNESS MEASUREMENT

WARNING: Refer to [Brake Dust Warning](#) .

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. [Front Disc Brake Pads Replacement](#), and/or [Rear Disc Brake Pads Replacement](#)
2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Using a micrometer (1) calibrated in thousandths-of-a-millimeter, or ten-thousandths-of-an-inch, measure and record the lowest thickness of the brake rotor at 4 or more points, equally spaced around the rotor.



Ensure that the measurements are only taken within the friction surfaces and that the micrometer is positioned the same distance from the outside edge of the rotor, about 13 mm (1/2 in), for each measurement.

4. Compare the lowest thickness measurement recorded to the brake rotor discard thickness specifications. [Disc Brake Component Specifications](#)
5. If the lowest thickness measurement of the brake rotor is above the discard thickness specification, the brake rotor may be refinished, depending upon surface and wear conditions which may be present.
6. If the lowest thickness measurement of the brake rotor is at or below the discard thickness specification, the rotor requires replacement. [Front Brake Rotor Replacement](#), and/or [Rear Brake Rotor Replacement](#)

BRAKE ROTOR THICKNESS VARIATION MEASUREMENT

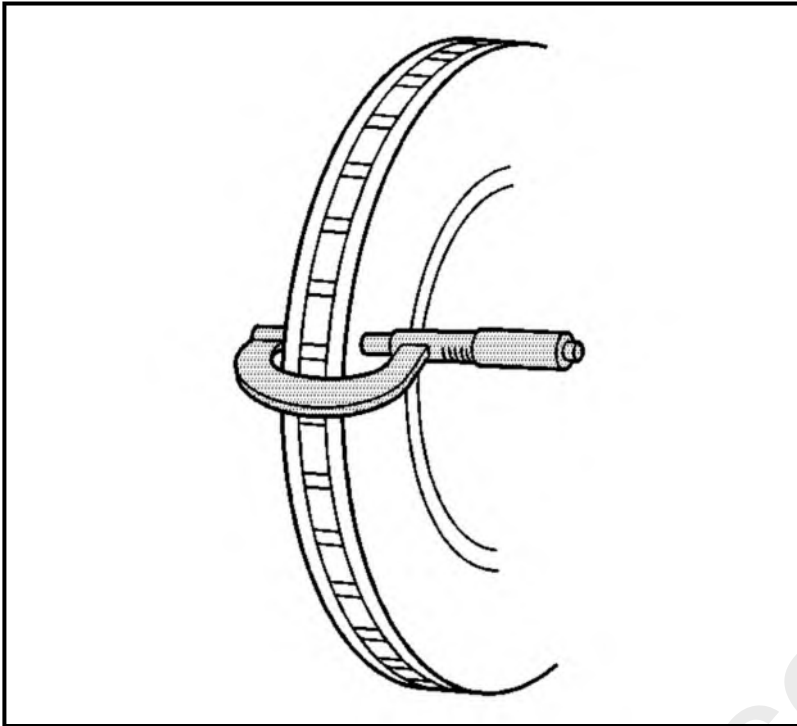
WARNING: Refer to [Brake Dust Warning](#) .

NOTE: Any disc brake rotor that exhibits thickness variation exceeding the maximum acceptable level must be refinished or replaced. Thickness variation exceeding the maximum acceptable level can cause brake pulsation.

NOTE: Do not remove the brake rotor from the wheel hub.

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the brake caliper bracket and/or brake caliper with the brake pads. Refer to [Front Brake Rotor Replacement](#), and/or [Rear Brake Rotor Replacement](#).

2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Using a micrometer calibrated in thousandths-of-a-millimeter, or ten-thousandths-of-an-inch, measure and record the thickness of the brake rotor at 4 or more points, evenly spaced around the rotor.



Ensure that the measurements are only taken within the friction surfaces and that the micrometer is positioned the same distance from the outer edge of the rotor, about 13 mm (1/2 in), for each measurement.

4. Calculate the difference between the highest and lowest thickness measurements recorded to obtain the amount of thickness variation.
5. Compare the thickness variation measurement to the following specification:

Specification

Brake rotor maximum allowable thickness variation: 0.025 mm (0.001 in)

NOTE: Whenever a brake rotor is refinished or replaced, the assembled lateral runout (LRO) of the rotor must be measured to ensure optimum performance of the disc brakes.

6. If the brake rotor thickness variation measurement exceeds the specification, the rotor requires refinishing or replacement.

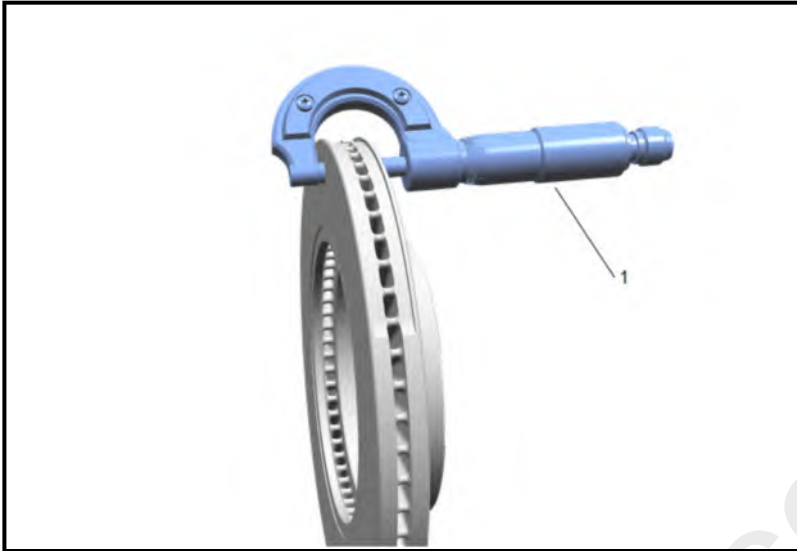
BRAKE ROTOR SURFACE AND WEAR INSPECTION

WARNING: Refer to [Brake Dust Warning](#) .

1. If the inboard friction surface of the brake rotor is not accessible, reposition and support the caliper with the brake pads. [Front Disc Brake Pads Replacement](#), and/or [Rear Disc Brake Pads Replacement](#)
2. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Inspect the friction surfaces of the brake rotor for any of the following:
 - Heavy rust and/or pitting

Light surface rust can be removed with an abrasive disc. Heavy surface rust and/or pitting must be removed by refinishing the rotor.

- Cracks and/or heat spots
 - Excessive bluing discoloration
4. If the friction surfaces of the brake rotor exhibit one or more of the above conditions, the rotor requires refinishing or replacement.
 5. Using a micrometer (1) calibrated in thousandths-of-a-millimeter, or ten-thousandths-of-an-inch, measure and record the scoring depth of any grooves present on the rotor friction surfaces.



6. Compare the groove scoring depth recorded to the following specification:

Specification

Brake rotor maximum allowable scoring: 1.5 mm (0.059 in)

7. If the brake rotor scoring depth exceeds the specification, or if an excessive amount of scoring is present, the rotor requires refinishing or replacement.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT MEASUREMENT

Special Tools

- CH-41013 Rotor Resurfacing Kit
- CH-42450-A Wheel Hub Resurfacing Kit
- CH-45101 Hub and Wheel Runout Gauge
- CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to [Special Tools](#).

WARNING: Refer to [Brake Dust Warning](#) .

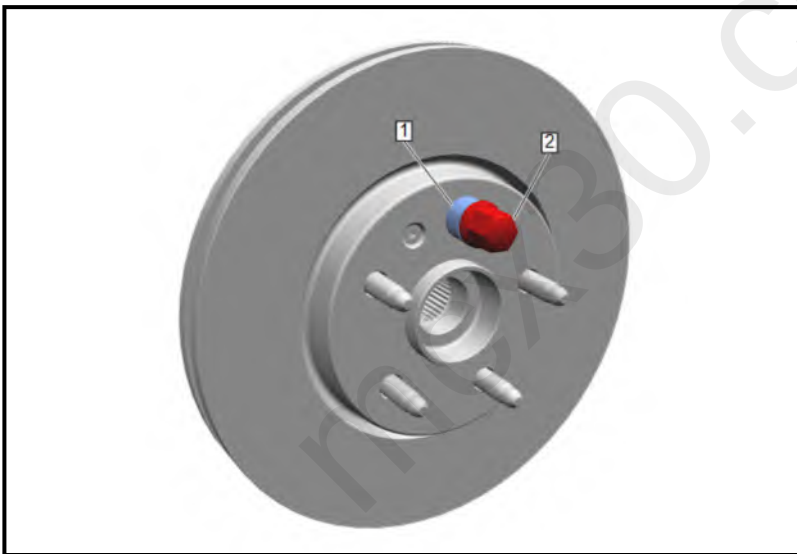
NOTE:

- Brake rotor assembled lateral runout (LRO) exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4, 800 - 11, 300 km (3, 000 - 7, 000 mi).
- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. [Brake Rotor Thickness Variation Measurement](#)

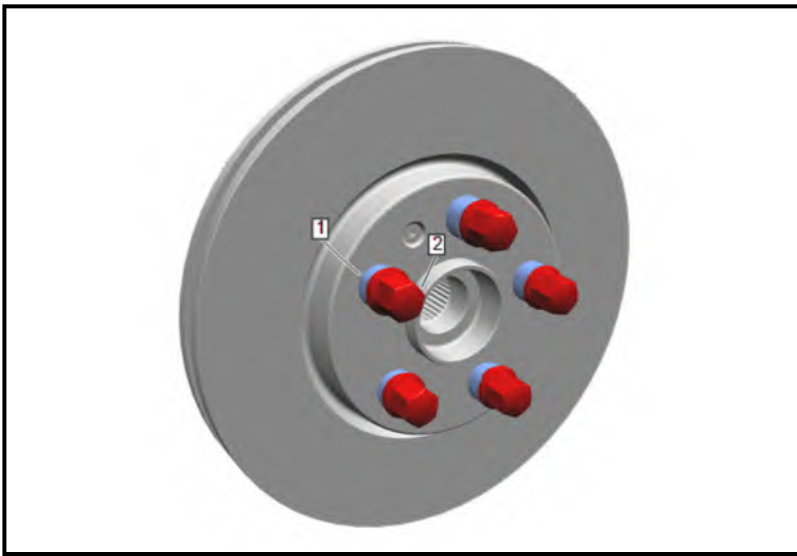
1. Match-mark the position of the brake rotor to the wheel studs if this has not been done already.

NOTE: Whenever the brake rotor has been separated from the hub/axle flange, any rust or contaminants should be cleaned from the hub/axle flange and the brake rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

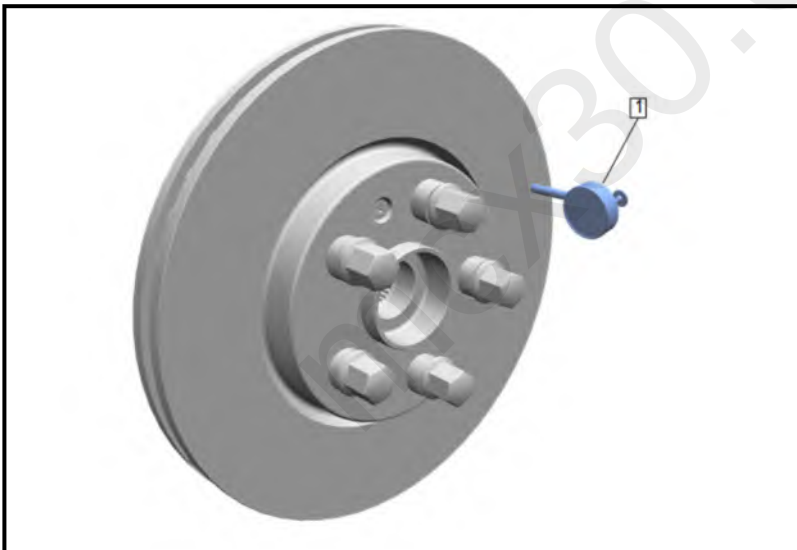
2. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles, corrosion, rust, or debris remaining. If the wheel hub/axle flange and/or if the brake rotor mating surfaces exhibit these conditions, perform the following steps:
 1. Remove the brake rotor from the vehicle. **Front Brake Rotor Replacement**, and/or **Rear Brake Rotor Replacement**
 2. Using the **CH-42450-A** wheel hub resurfacing kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.
 3. Using the **CH-41013** rotor resurfacing kit, thoroughly clean any rust or corrosion from the mating surface of the brake rotor.
 4. Clean the friction surfaces of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
3. Install the rotor to the hub/axle flange using the match-mark made prior to removal.
4. Hold the rotor firmly in place against the hub/axle flange and install one of the **CH-45101-100** conical brake rotor washers (1), and one lug nut (2) onto the upper-most wheel stud.



5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.
6. Install the remaining **CH-45101-100** conical brake rotor washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.



7. Tighten the lug nuts in a star-pattern to specification. [Tire and Wheel Removal and Installation](#)
8. If the brake rotor has been REFINISHED or REPLACED with a new rotor, proceed to step 14.
9. If the brake rotor meets the following criteria, proceed to step 10.
 - The rotor is within specifications and is being REUSED.
 - The rotor has NOT been refinished.
 - The rotor does NOT exhibit thickness variation exceeding the maximum allowable level.
10. Mount a dial indicator, **CH-45101** hub and wheel runout gauge, or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0.5 in) from the outer edge of the rotor.



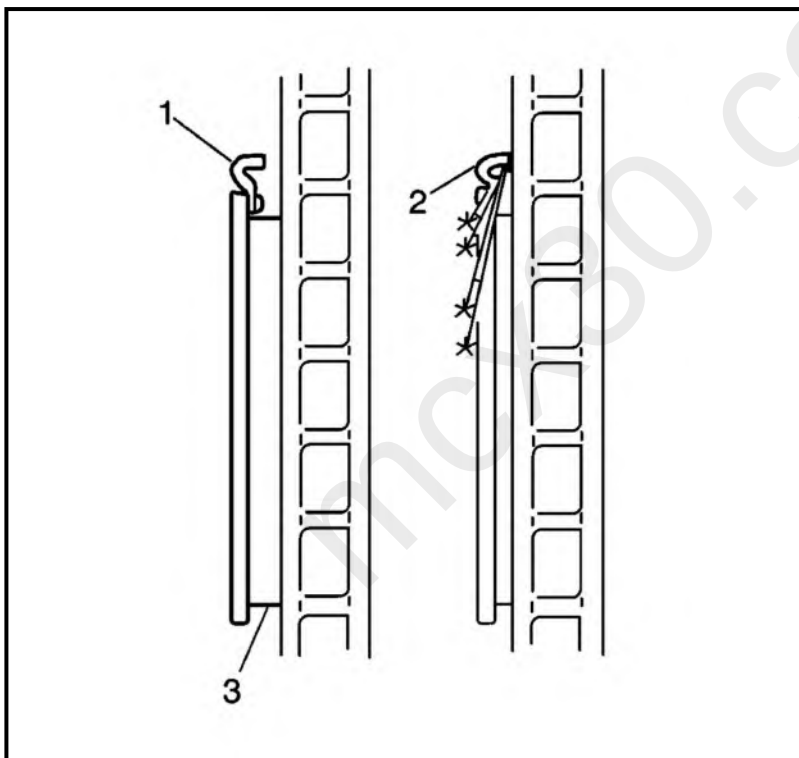
11. Measure and record the assembled LRO of the brake rotor.
 1. Rotate the rotor until the lowest reading is displayed on the indicator dial, then set the dial to zero.
 2. Rotate the rotor until the highest reading is displayed on the dial.
 3. Mark the location of the high spot relative to the nearest wheel stud, or studs.
 4. Measure and record the amount of LRO.
12. Compare the brake rotor assembled LRO to the disc brake component specifications. [Disc Brake Component Specifications](#)
13. If the brake rotor assembled LRO is within specifications, proceed to step 18.

If the brake rotor assembled LRO exceeds the specification, refinish the rotor to ensure true parallelism. [Brake Rotor Refinishing](#) After refinishing the rotor, proceed to step 14.

14. Mount a dial indicator, **CH-45101** hub and wheel runout gauge, or equivalent, to the steering knuckle and position the indicator button so it contacts the brake rotor friction surface at a 90 degree angle, approximately 13 mm (0.5 in) from the outer edge of the rotor.
15. Measure and record the assembled LRO of the brake rotor.
 1. Rotate the rotor until the lowest reading is displayed on the indicator dial, then set the dial to zero.
 2. Rotate the rotor until the highest reading is displayed on the dial.
 3. Mark the location of the high spot relative to the nearest wheel stud, or studs.
 4. Measure and record the amount of LRO.
16. Compare the brake rotor assembled LRO to the disc brake component specifications. [Disc Brake Component Specifications](#)
17. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. [Brake Rotor Assembled Lateral Runout Correction](#)
18. If the brake rotor assembled LRO measurement is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **CH-45101-100** conical brake rotor washers and the lug nuts.

BRAKE PAD INSPECTION

1. Inspect the disc brake pads at regular intervals, or whenever the tire and wheel assemblies are removed from the vehicle.



WARNING: Refer to [Brake Dust Warning](#) .

NOTE: Some pads are designed to be bonded to the caliper for noise suppression. This bond should only be undone when pads are replaced.

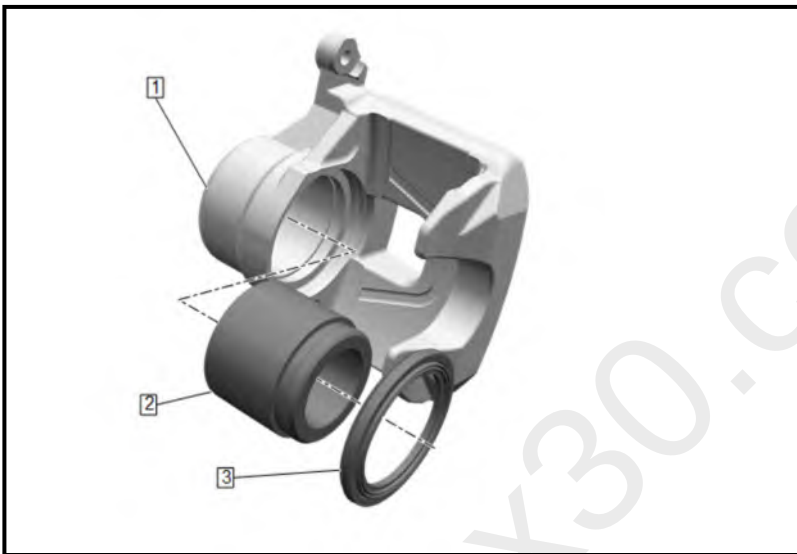
2. If replacement is necessary, always replace disc brake pads in axle sets.
3. Inspect both edges of the disc brake pad friction surfaces (3). The highest rate of wear normally occurs at the trailing edge of the disc brake pads.
4. Inspect the thickness of the disc brake pads (3) in order to ensure that they have not worn prematurely. The disc brake pad wear should be approximately even per axle set.

NOTE: When replacing the disc brake pads, maintain the same disc brake pad wear sensor orientation.

5. Both front and rear disc brake pads have integral, audible wear sensors (1). When the disc brake pad wear reaches the minimum allowable thickness, the wear sensor contacts the disc brake rotor (2). The wear indicator will then produce an audible, high-pitched warning noise during wheel rotation.
6. Replace the disc brake pads when the friction surface (3) is worn to within 2.0 mm (0.080 in) of the mounting plates.
7. Replace the disc brake pads if any have separated from the mounting plates.
8. Inspect the disc brake pads friction surfaces for cracks, fractures, or damage which may cause noise or otherwise impair disc brake performance.

BRAKE CALIPER INSPECTION

1. Inspect the brake caliper housing (1) for cracks, excess wear, and/or damage. If any of these conditions are present, the brake caliper requires replacement.



WARNING: Refer to [Brake Dust Warning](#) .

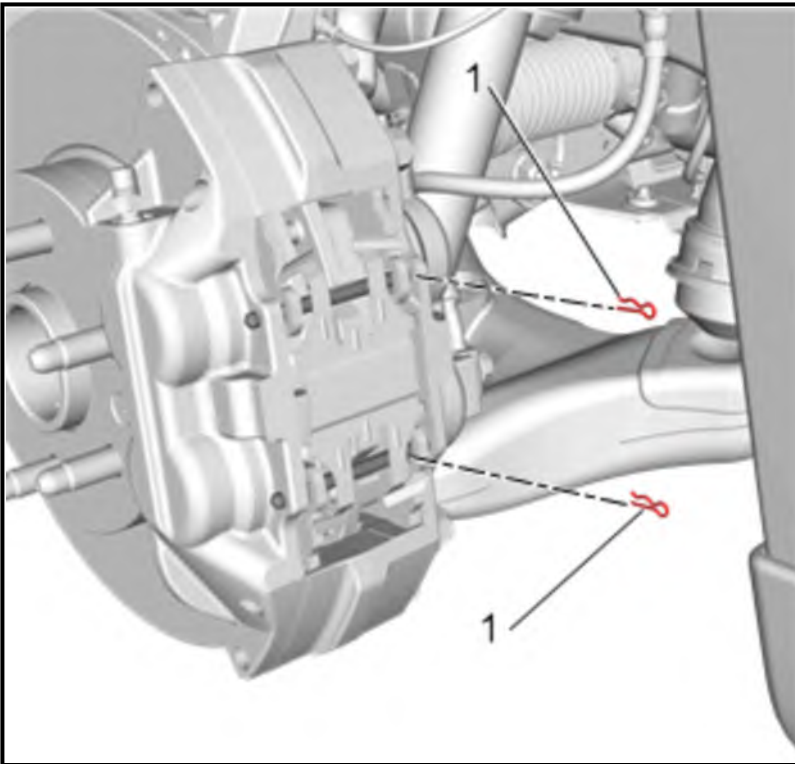
2. Inspect the caliper piston dust boot seal (3) for cracks, tears, cuts, deterioration and/or improper seating in the caliper body. If any of these conditions are present, the brake caliper requires overhaul or replacement.
3. Inspect for brake fluid leakage around the caliper piston dust boot seal (3) and on the disc brake pads. If there is any evidence of brake fluid leakage, the brake caliper requires overhaul or replacement.
4. Inspect for smooth and complete travel of the caliper piston (2) into the caliper bores. The movement of the caliper piston (2) into the caliper bores should be smooth and even. If the caliper piston (2) is frozen or difficult to bottom, the caliper requires overhaul or replacement.

FRONT DISC BRAKE MOUNTING AND HARDWARE INSPECTION

WARNING: Refer to [Brake Dust Warning](#) .

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum - full point and the minimum allowable level then no brake fluid needs to be removed from the reservoir before proceeding.
3. If the brake fluid level is higher than midway between the maximum - full point and the minimum allowable level then remove brake fluid to the midway point before proceeding.
4. Raise and support the vehicle. Refer [Lifting and Jacking the Vehicle](#) .
5. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .

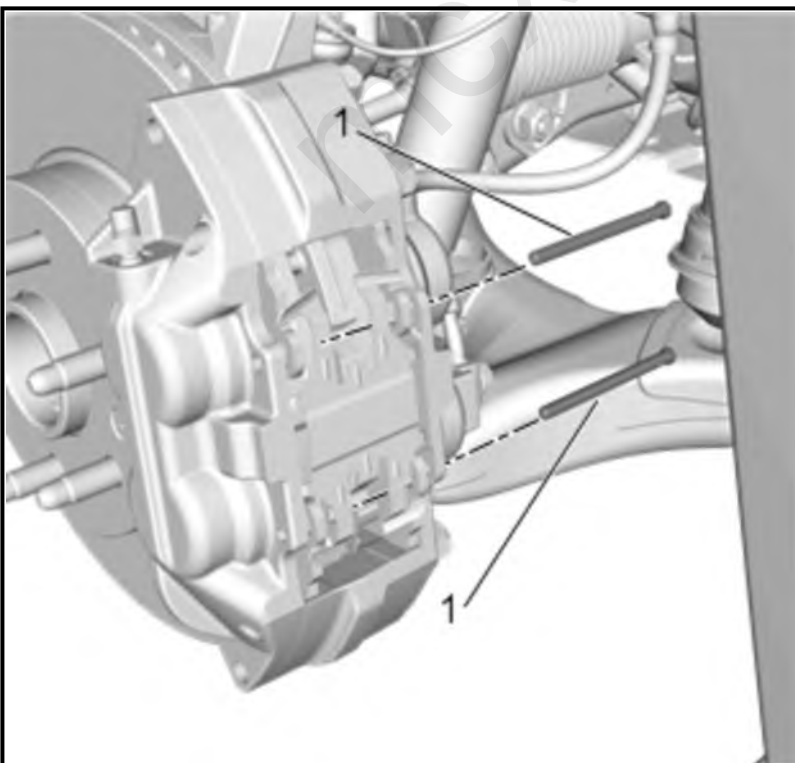
6. Inspect the disc brake pad pin clips (1) for the following:



- Missing pin clips
- Excessive corrosion
- Excessive looseness
- Deformed pin clips

7. If any of the conditions listed are found, the disc brake pad pin clips require replacement.

8. Carefully drive out the brake caliper pins (1) from the brake caliper and inspect the pins for the following:

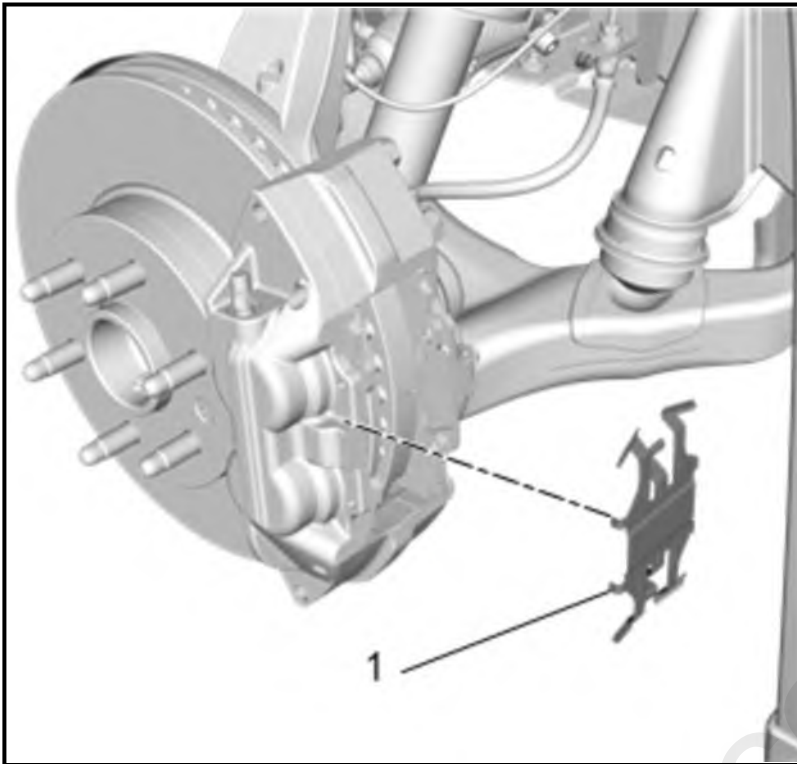


- Excessive corrosion
- Excessive looseness

- Deformed pins

9. If any of the conditions listed are found, the brake caliper pins require replacement.

10. Inspect the brake pad spring (1) for the following:



- Missing
- Broken
- Excessive corrosion
- Deformation

11. If any of the conditions listed are found, the brake pad spring requires replacement.

12. Install the disc brake pad mounting hardware. Refer to [Front Disc Brake Pads Replacement](#).

13. Ensure the disc brake pads are held firmly in place in the brake caliper, yet slide easily on the mounting hardware without binding.

REAR DISC BRAKE MOUNTING AND HARDWARE INSPECTION

WARNING: Refer to [Brake Dust Warning](#) .

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum - full point and the minimum allowable level then no brake fluid needs to be removed from the reservoir before proceeding.
3. If the brake fluid level is higher than midway between the maximum - full point and the minimum allowable level then remove brake fluid to the midway point before proceeding.

WARNING: Do not use a service jack in locations other than those specified to lift this vehicle. Lifting the vehicle with a jack in those other locations could cause the vehicle to slip off the jack and roll; this could cause injury or death.

4. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
5. Remove the tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
6. Grasp the brake caliper housing and try to move the brake caliper housing up/down and forward/reverse in relation to the brake caliper mounting bracket. If excessive looseness is observed the brake caliper bracket bushings and/or the brake caliper mounting bolts may need to be replaced.

7. Compress the rear caliper piston.

1. Install a large C-clamp over the top of the caliper housing and against the back of the outboard pad.
2. Slowly tighten the C-clamp until the pistons are pushed completely into the caliper bores.
3. Remove the C-clamp from the caliper.

8. With the piston compressed into the caliper bore, grasp the brake caliper housing and slide it back and forth on the brake caliper mounting bolts. Check for smooth operation. If the brake caliper housing slide force is high or the brake caliper housing does not slide smoothly, inspect the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings for wear or damage. If wear or damage conditions are found, replacement of the brake caliper mounting bolts and/or the brake caliper mounting bracket bushings is necessary.

9. Remove the brake caliper mounting bolts from the brake caliper mounting bracket and support the brake caliper using heavy mechanics wire. Do not disconnect the hydraulic brake hose from the caliper. **Rear Brake Caliper Replacement**

10. Remove the disc brake pads from the brake caliper mounting bracket.

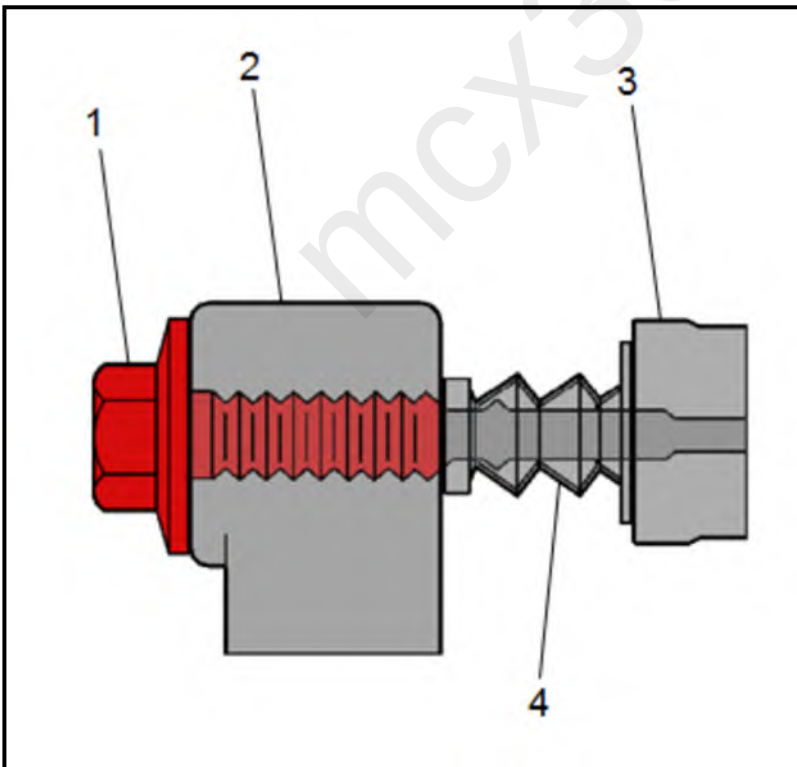
11. Inspect the disc brake pad mounting hardware for the following:

- Missing mounting hardware
- Excessive corrosion
- Bent mounting tabs
- Looseness at the brake caliper mounting bracket
- Looseness at the disc brake pads
- Excessive contaminants in the brake caliper mounting bracket surface and threads.

12. If any of the conditions listed are found, the disc brake pad mounting hardware requires replacement.

13. Ensure the disc brake pads are held firmly in place on the brake caliper mounting bracket, yet slide easily on the mounting hardware without binding.

14. Inspect the caliper bolts (1) or guide pins for the following:



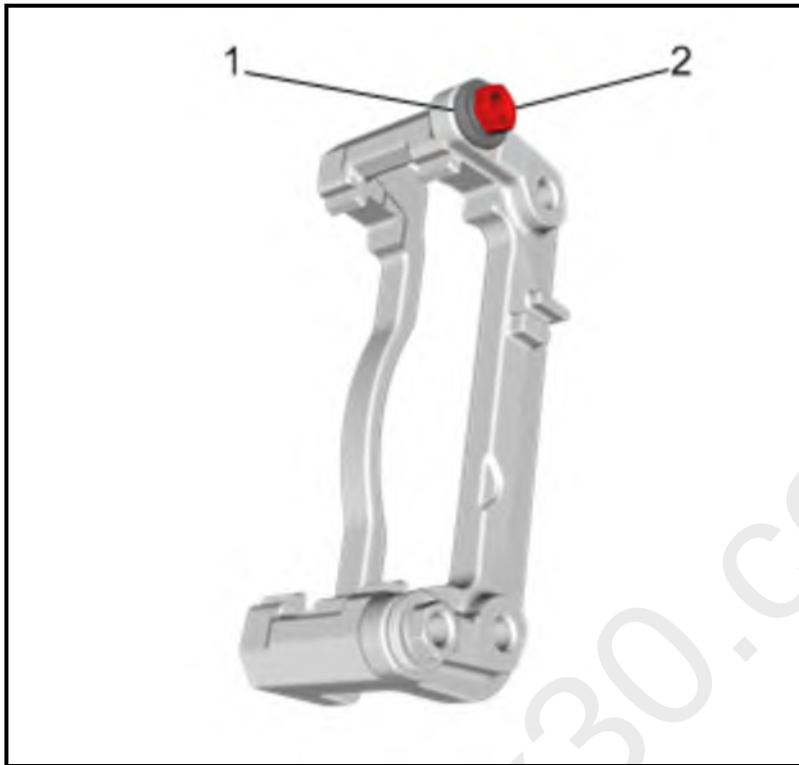
- Binding
- Seizing
- Looseness in the brake caliper mounting bracket (3)
- Bent or damaged brake caliper mounting bolts or guide pins

- Cracked or torn boots (4)
- Missing boots
- Bent or damaged brake caliper mounting bracket (3)

15. If any of the conditions listed are found then the brake caliper mounting hardware requires replacement.

16. Install the disc brake pads to the brake caliper mounting bracket.

17. Gently pull the edge of the upper guide pin seal (1) away from the brake caliper guide pin (2) while simultaneously pushing the brake caliper guide pin into the brake caliper bracket to expel any trapped air and excess brake lubricant.



NOTE: Excess brake lubricant and trapped air must be expelled from the brake caliper guide pin bore to allow full caliper movement and prevent premature brake pad wear.

18. Repeat step 17 for the lower guide pin seal and brake caliper guide pin.

19. With a clean shop towel, clean any excess brake lubricant from the guide pin seal and brake caliper guide pin.

20. Install the disc brake caliper to the brake caliper mounting bracket. [Rear Brake Caliper Replacement](#)

REPAIR INSTRUCTIONS

FRONT DISC BRAKE PADS REPLACEMENT

WARNING: [Brake Dust Warning](#)

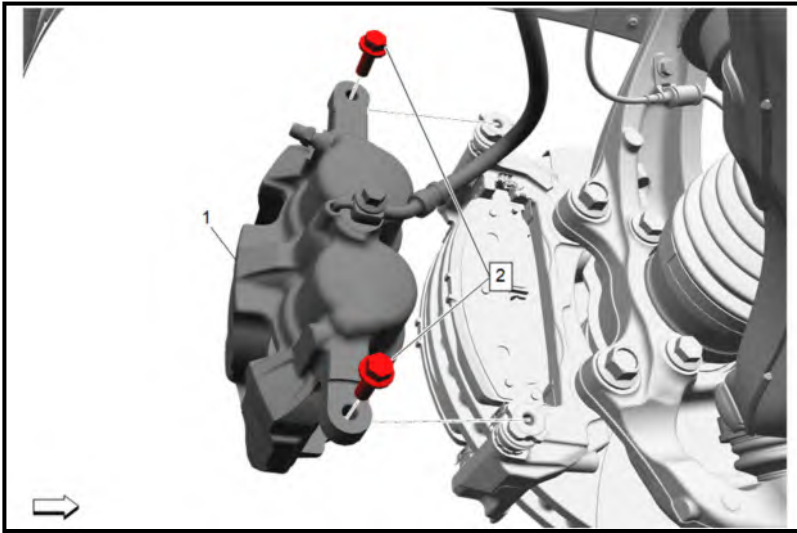
WARNING: [Brake Fluid Irritant Warning](#)

NOTE: Always replace disc brake pads in axle sets.

Removal Procedure

1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the fluid level is midway between the maximum-full point and the minimum allowable level, no fluid needs to be removed from the reservoir before proceeding.

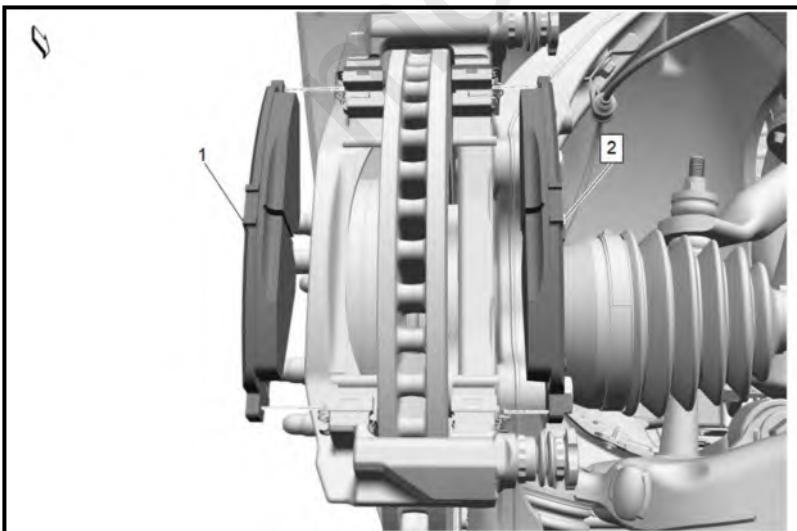
3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding.
4. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
5. Remove the front tire and wheel assemblies. [Tire and Wheel Removal and Installation](#)
6. Front Brake Caliper Guide Pin Bolt (2) - Remove [2x]



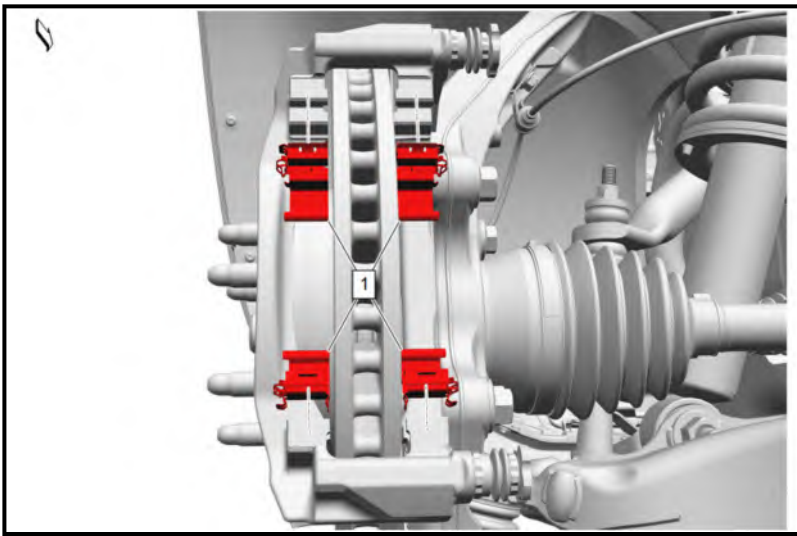
NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

7. Remove the brake caliper and support with heavy mechanics wire. (1)
8. Front Disc Brake Outer Pad (1) - Remove



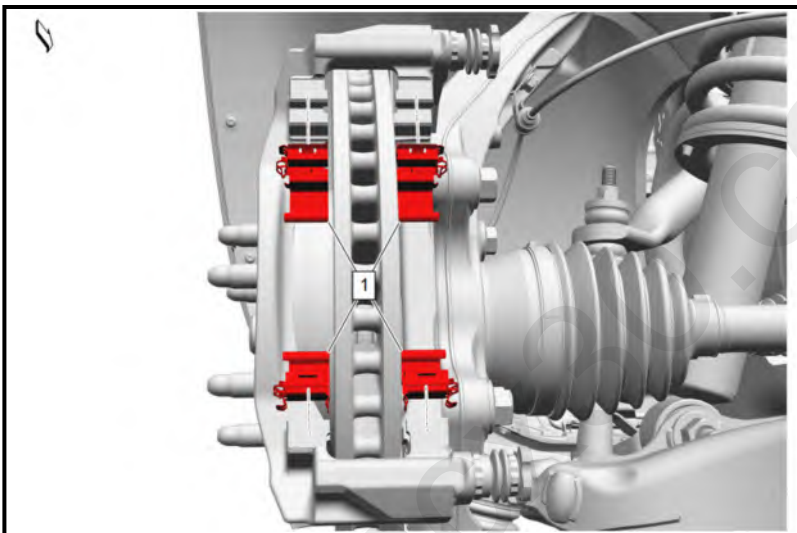
9. Front Disc Brake Inner Pad (2) - Remove
10. Front Disc Brake Pad Retaining Spring (1) - Remove [4x]



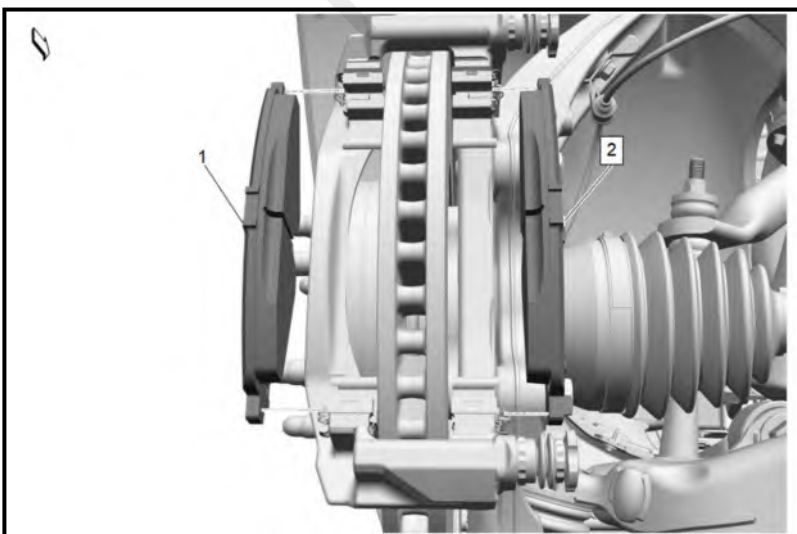
11. Use a suitable tool to compress the front brake caliper pistons into the front brake caliper.

Installation Procedure

1. Front Disc Brake Pad Retaining Spring (1) - Install [4x]

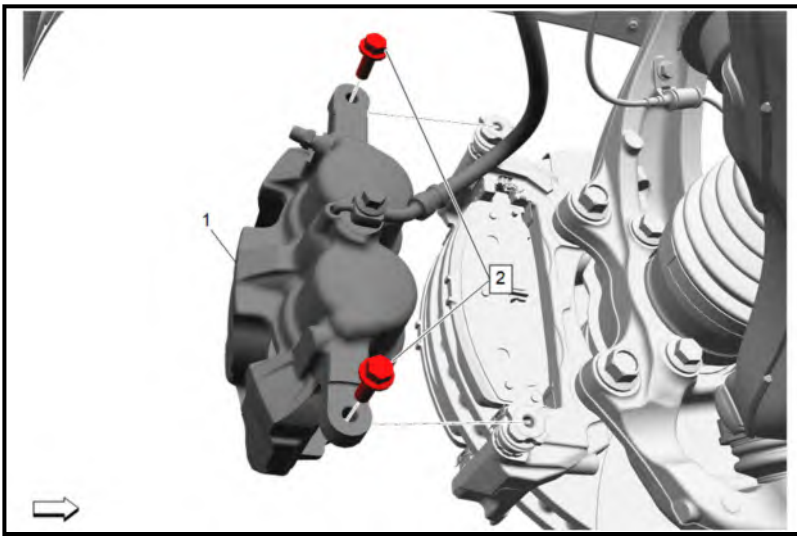


2. Front Disc Brake Inner Pad (2) - Install



3. Front Disc Brake Outer Pad (1) - Install

4. Front Brake Caliper (1) - Install



CAUTION: Refer to [Fastener Caution](#) .

NOTE: Refer to the procedure link for torque specification.

5. Front Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] - [Front Brake Caliper Replacement](#)
6. Install the front tire and wheel assemblies. [Tire and Wheel Removal and Installation](#)
7. Remove the supports and lower the vehicle.
8. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
9. Slowly release the brake pedal.
10. Wait 15 seconds, then repeat steps 8 - 9 until a firm brake pedal is obtained. This will properly seat the brake caliper pistons and brake pads.
11. Fill the brake master cylinder reservoir to the maximum-full level with GM approved brake fluid from a clean, sealed brake fluid container. [Adhesives, Fluids, Lubricants, and Sealers](#)
12. Burnish the brake pads and rotors. [Brake Pad and Rotor Burnishing](#)

REAR DISC BRAKE PADS REPLACEMENT

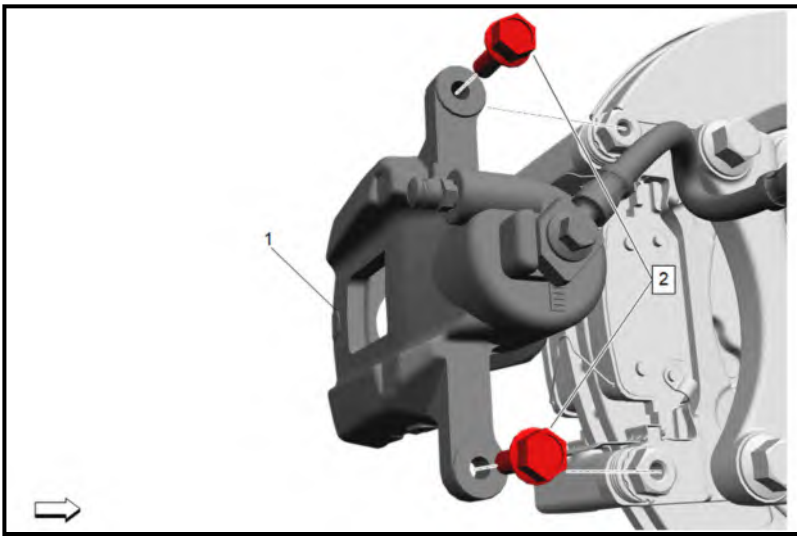
WARNING: [Brake Dust Warning](#)

WARNING: [Brake Fluid Irritant Warning](#)

NOTE: Always replace disc brake pads in axle sets.

Removal Procedure

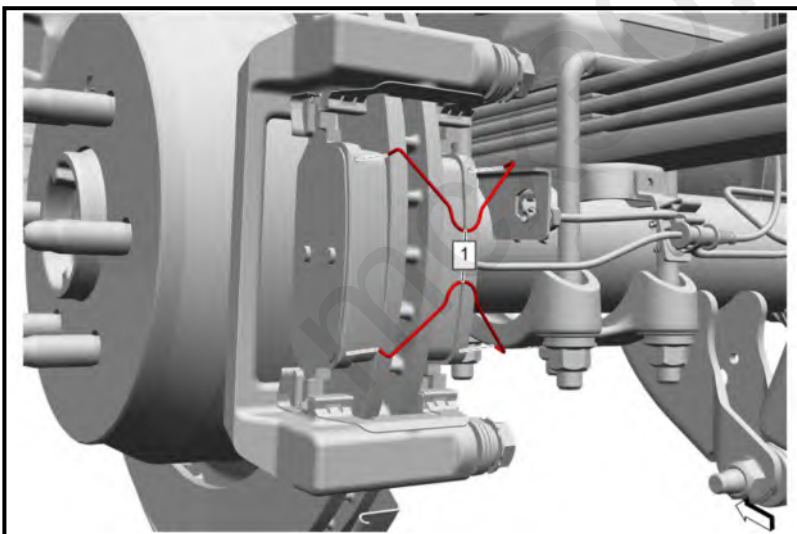
1. Inspect the fluid level in the brake master cylinder reservoir.
2. If the brake fluid level is midway between the maximum-full point and the minimum allowable level, no brake fluid needs to be removed before proceeding.
3. If the brake fluid level is higher than midway between the maximum-full point and the minimum allowable level, remove brake fluid to the midway point before proceeding.
4. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
5. Remove the rear tire and wheel assemblies. [Tire and Wheel Removal and Installation](#)
6. Rear Brake Caliper Guide Pin Bolt (2) - Remove [2x]



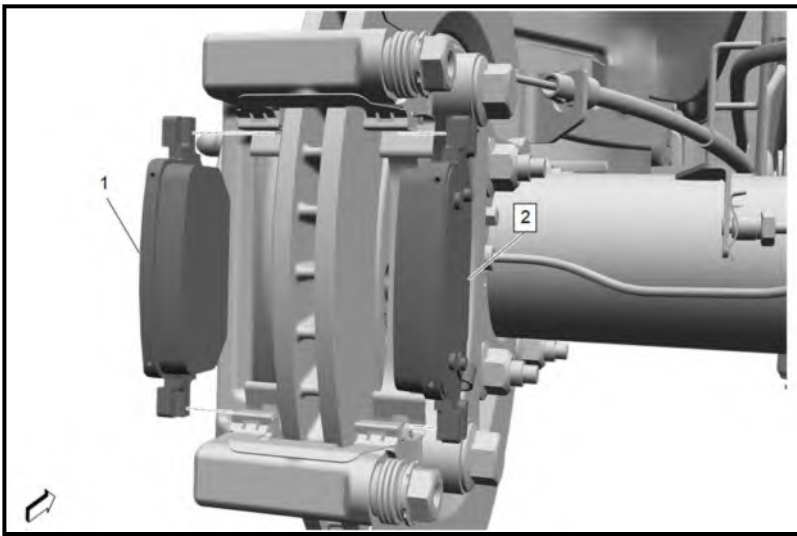
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CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

7. Remove the brake caliper and support with heavy mechanics wire. (1)
8. Rear Disc Brake Pad Spring (1) - Remove [2x]



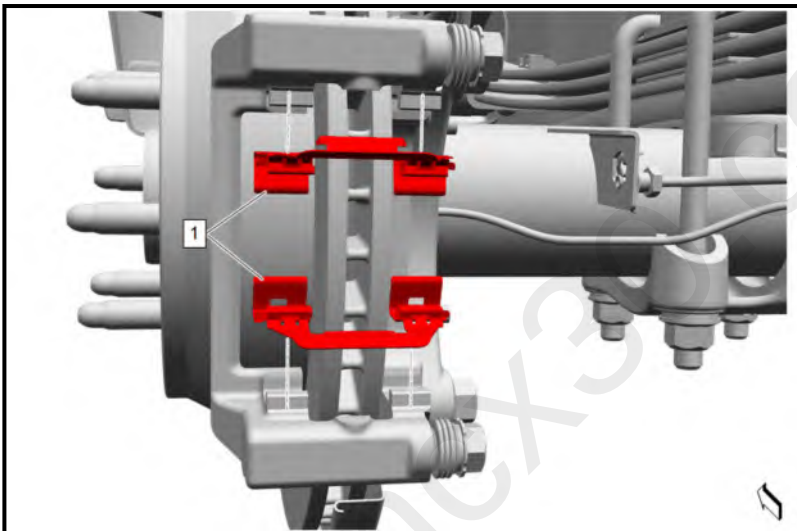
9. Rear Disc Brake Pad- Outer (1) - Remove



NOTE: The inner brake pad is equipped with a wear sensor. Note the location of the wear sensor.

10. Rear Disc Brake Pad- Inner (2) - Remove

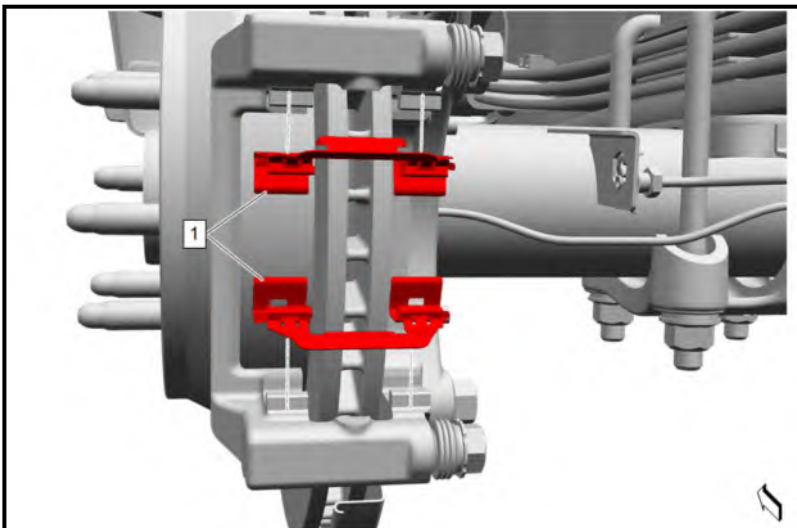
11. Rear Disc Brake Pad Retainer (1) - Remove [2x]



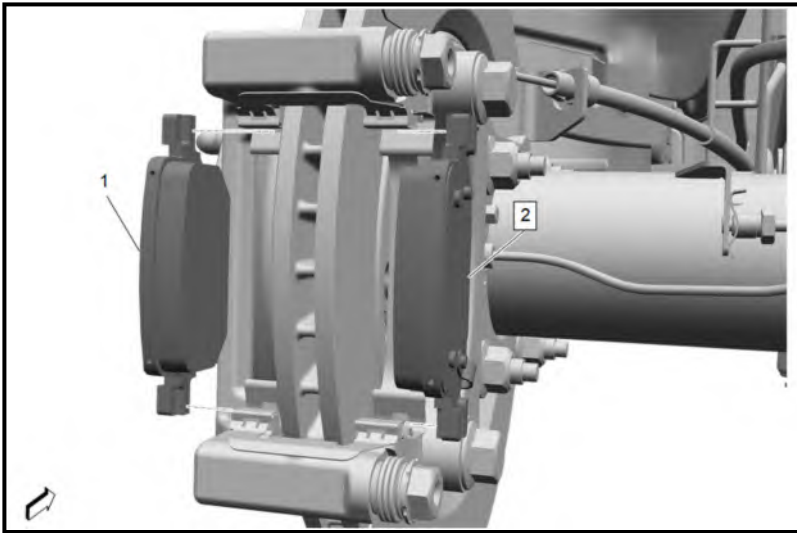
12. Use a suitable tool to compress the rear brake caliper pistons into the rear brake caliper.

Installation Procedure

1. Rear Disc Brake Pad Retainer (1) - Install [2x]



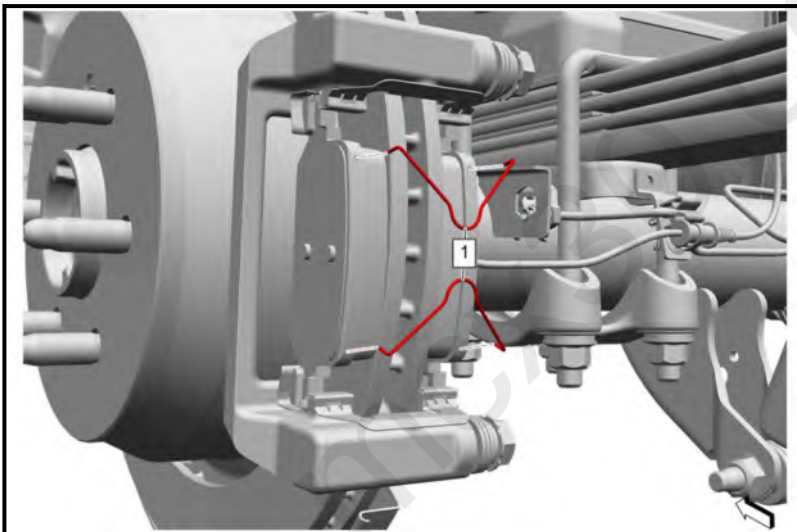
2. Rear Disc Brake Pad- Inner (2) - Install



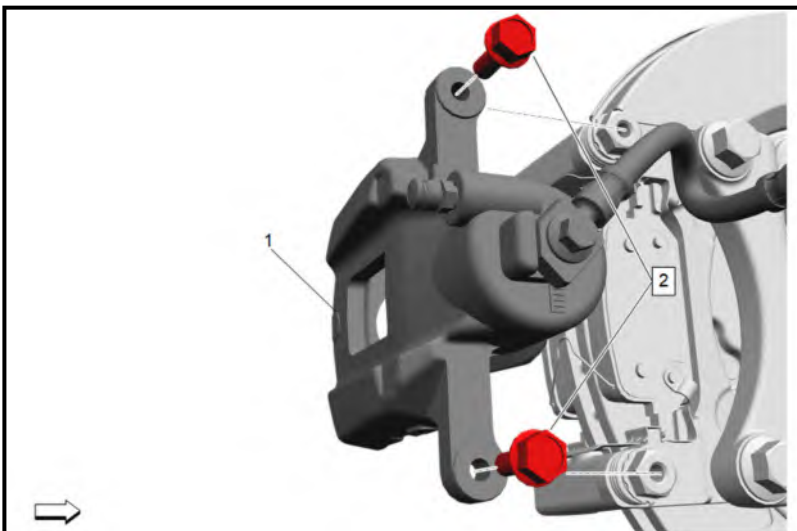
NOTE: The inner brake pad is equipped with the wear sensor. Position the brake pad with the wear sensor in the same location as noted during removal.

3. Rear Disc Brake Pad- Outer (1) - Install

4. Rear Disc Brake Pad Spring (1) - Install [2x]



5. Rear Brake Caliper (1) - Install



CAUTION: [Fastener Caution](#)

NOTE: Refer to the procedure link for torque specification.

6. Rear Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] - [Rear Brake Caliper Replacement](#)
7. Install the rear tire and wheel assemblies. [Tire and Wheel Removal and Installation](#)
8. Remove the support and lower the vehicle.
9. With the engine OFF, gradually apply the brake pedal to approximately 2/3 of its travel distance.
10. Slowly release the brake pedal.
11. Wait 15 seconds, then repeat steps 9 - 10 until a firm brake pedal is obtained. This will properly seat the front brake caliper pistons and front disc brake pads.
12. Fill the brake master cylinder reservoir to the maximum-full level with GM approved brake fluid from a clean, sealed brake fluid container. [Brake Master Cylinder Reservoir Filling](#)
13. Burnish the brake pads and rotors. [Brake Pad and Rotor Burnishing](#)

BRAKE PAD AND ROTOR BURNISHING

WARNING: Road test a vehicle under safe conditions and while obeying all traffic laws. Do not attempt any maneuvers that could jeopardize vehicle control. Failure to adhere to these precautions could lead to serious personal injury and vehicle damage.

Burnishing the brake pads and brake rotors is necessary in order to ensure that the braking surfaces are properly prepared after service has been performed on the disc brake system.

This procedure should be performed whenever the disc brake rotors have been refinished or replaced, and/or whenever the disc brake pads have been replaced.

1. Select a smooth road with little or no traffic.
2. Accelerate the vehicle to 48 km/h (30 mph).

NOTE: Use care to avoid overheating the brakes while performing this step.

3. Using moderate to firm pressure, apply the brakes to bring the vehicle to a stop. Do not allow the brakes to lock.
4. Repeat steps 2 and 3 until approximately 20 stops have been completed. Allow sufficient cooling periods between stops in order to properly burnish the brake pads and rotors.

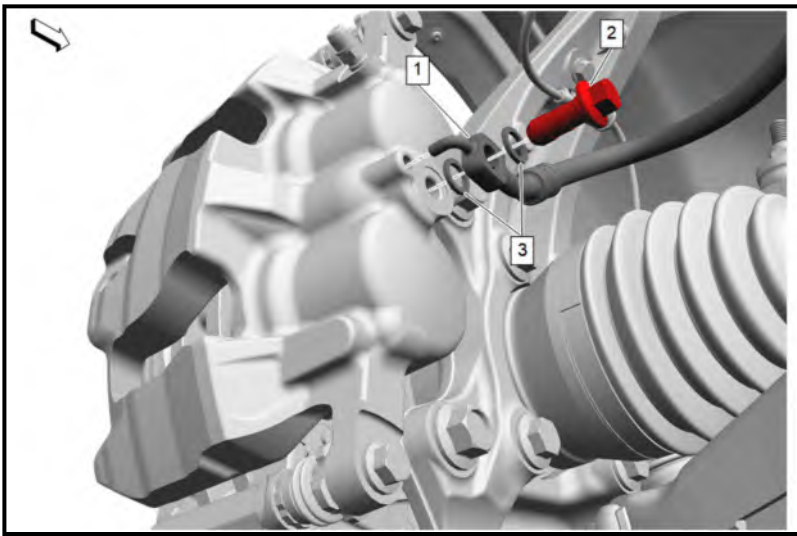
FRONT BRAKE CALIPER REPLACEMENT

WARNING: [Brake Dust Warning](#)

WARNING: [Brake Fluid Irritant Warning](#)

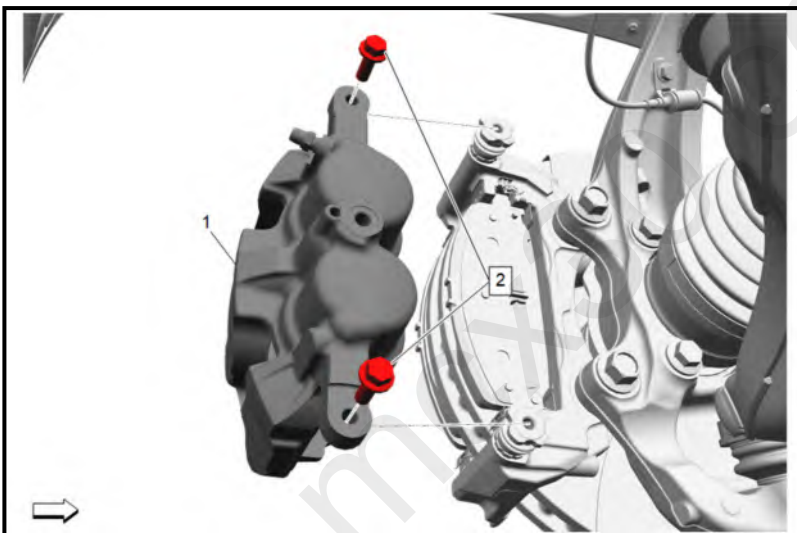
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Front Brake Hose Fitting (2) - Remove



NOTE: Do NOT reuse the brake hose washers.

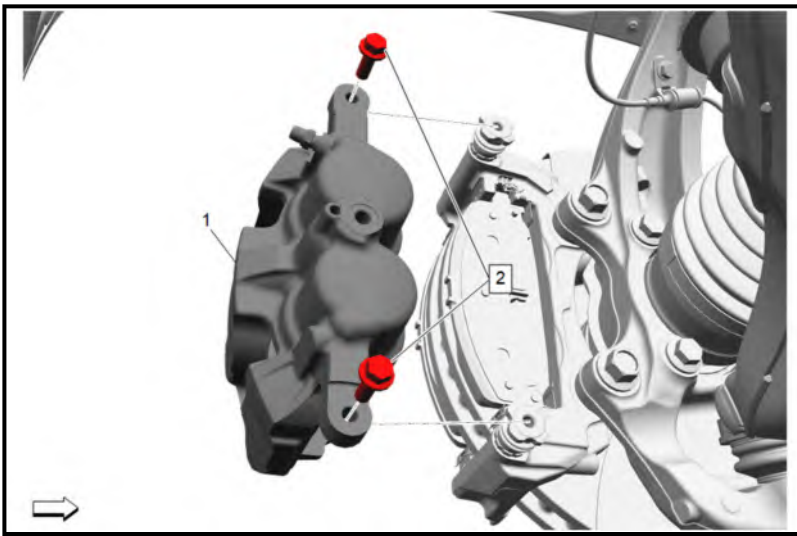
4. Front Brake Hose Washer (3) - Remove and DISCARD [2x]
5. Front Brake Hose (1) @ Front Brake Caliper - Remove
6. Cap the front brake hose outlet to prevent brake fluid loss and contamination.
7. Front Brake Caliper Guide Pin Bolt (2) - Remove [2x]



8. Front Brake Caliper (1) - Remove

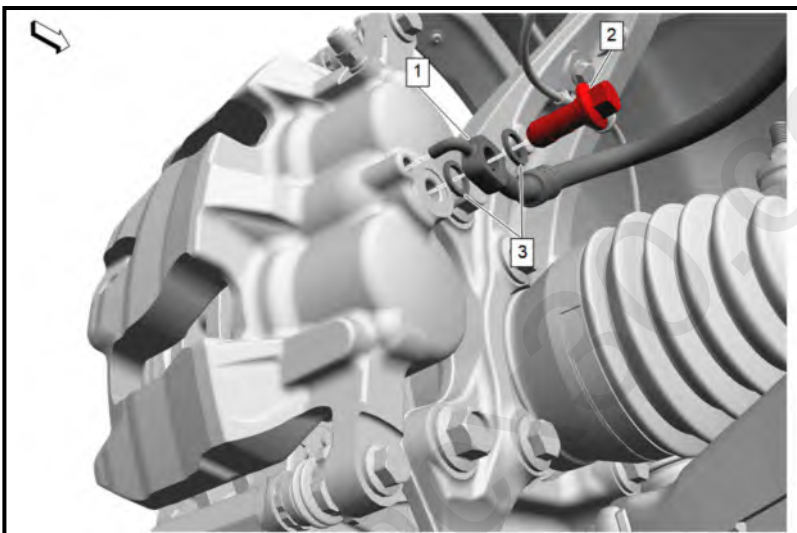
Installation Procedure

1. Front Brake Caliper (1) - Install



CAUTION: Fastener Caution

2. Front Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] 37 N.m (27 lb ft)
3. Front Brake Hose Washer (3) - Install NEW [2x]



4. Front Brake Hose (1) @ Front Brake Caliper - Install

NOTE: Refer to the procedure link for torque specification.

5. Front Brake Hose Fitting (2) - Install and tighten [Front Brake Hose Replacement](#) , or [Front Brake Hose Replacement](#)
6. Bleed the brake system. [Hydraulic Brake System Bleeding \(Manual\)](#) , or [Hydraulic Brake System Bleeding \(Pressure\)](#)
7. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

FRONT BRAKE CALIPER BLEEDER VALVE REPLACEMENT

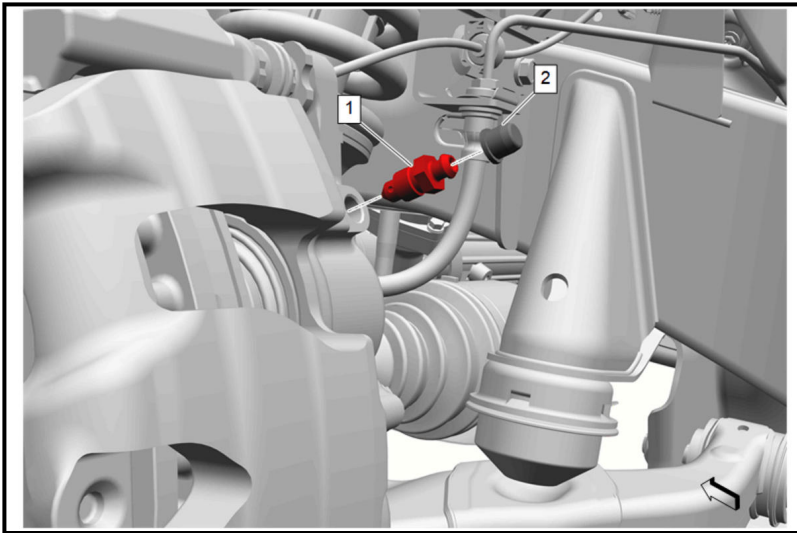
WARNING: Brake Dust Warning

WARNING: Brake Fluid Irritant Warning

Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

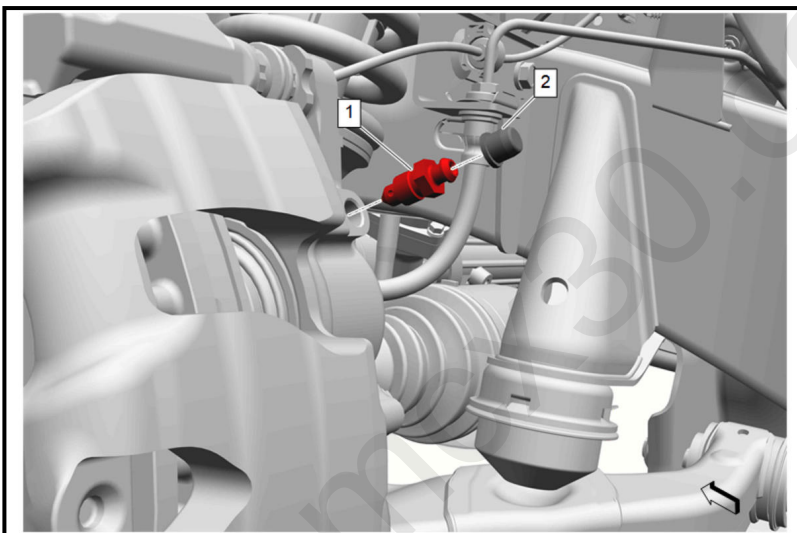
3. Front Brake Caliper Bleeder Valve Cap (2) - Remove



4. Front Brake Caliper Bleeder Valve (1) - Remove

Installation Procedure

1. Front Brake Caliper Bleeder Valve (1) - Install and tighten 11 N.m (97 lb in)



CAUTION: Component Fastener Tightening Caution

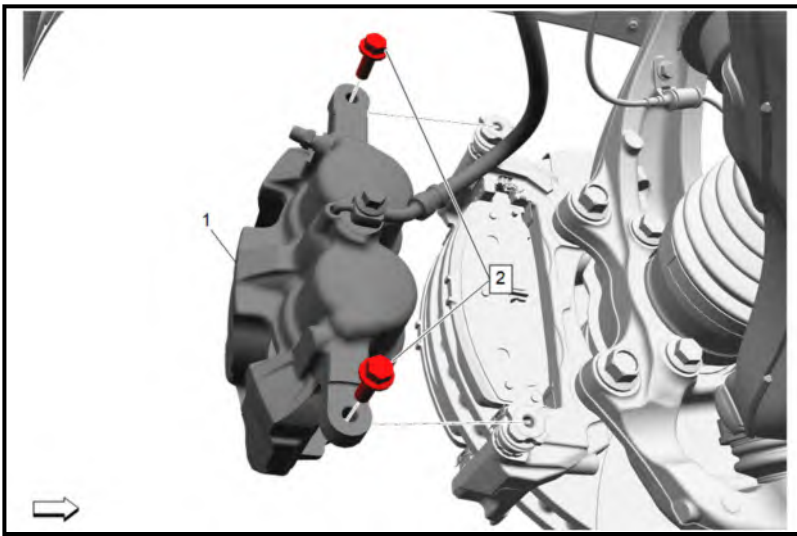
2. Front Brake Caliper Bleeder Valve Cap (2) - Install
3. Install the front tire and wheel assembly. Tire and Wheel Removal and Installation
4. Remove the support and lower the vehicle.

FRONT BRAKE CALIPER GUIDE PIN REPLACEMENT

WARNING: Brake Dust Warning

Removal Procedure

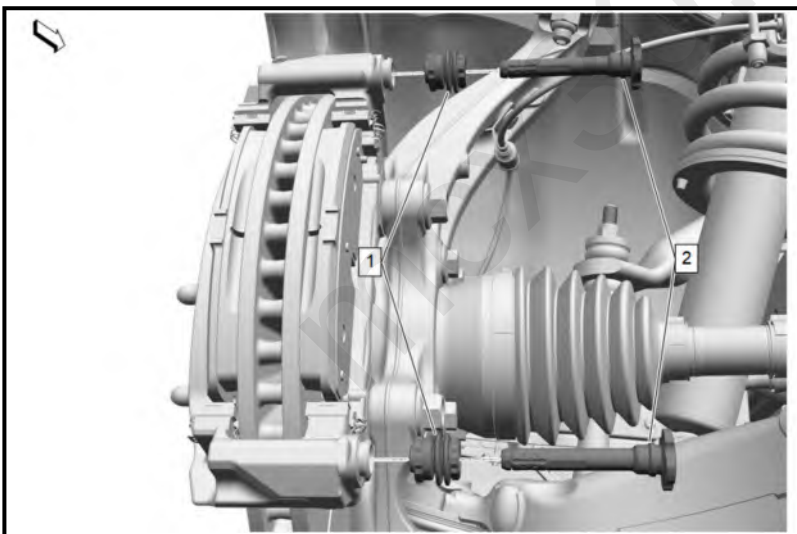
1. Raise and support the vehicle. Lifting and Jacking the Vehicle
2. Remove the tire and wheel assembly. Tire and Wheel Removal and Installation
3. Front Brake Caliper Guide Pin Bolt (2) - Remove [2x]



NOTE: Do NOT use any air tools to remove or install the guide pin bolts. Use hand tools ONLY.

CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

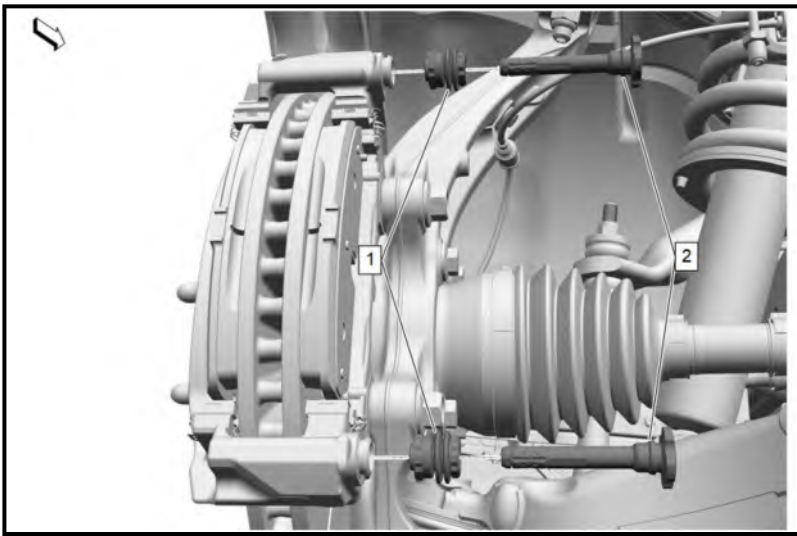
4. Remove the brake caliper and support with heavy mechanics wire. (1)
5. Front Brake Caliper Guide Pin (2) - Remove [2x]



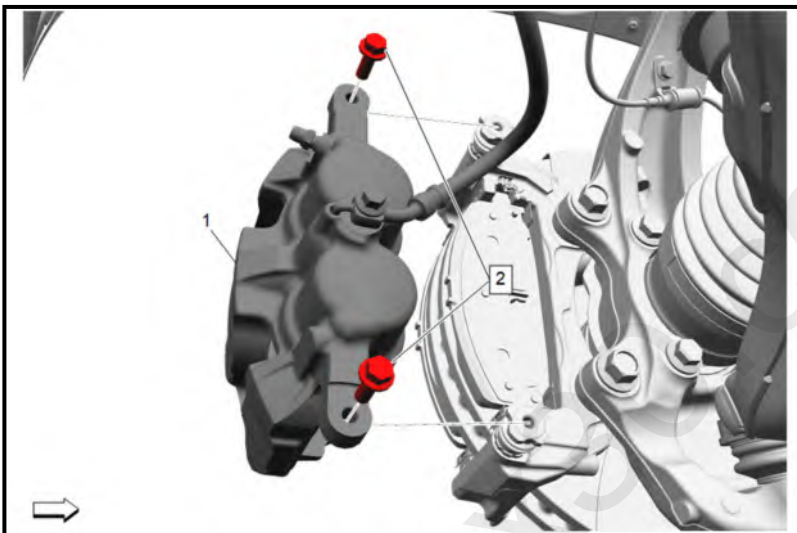
6. Front Brake Caliper Guide Pin Boot (1) - Remove [2x]

Installation Procedure

1. Front Brake Caliper Guide Pin Boot (1) - Install [2x]



2. Front Brake Caliper Guide Pin (2) - Install [2x]
3. Front Brake Caliper (1) - Install



NOTE: Refer to the procedure link for torque specification.

CAUTION: Fastener Caution

4. Front Brake Caliper Guide Pin Bolt (2) - Install [2x] - [Front Brake Caliper Replacement](#)
5. Install the tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
6. Remove the supports and lower the vehicle.

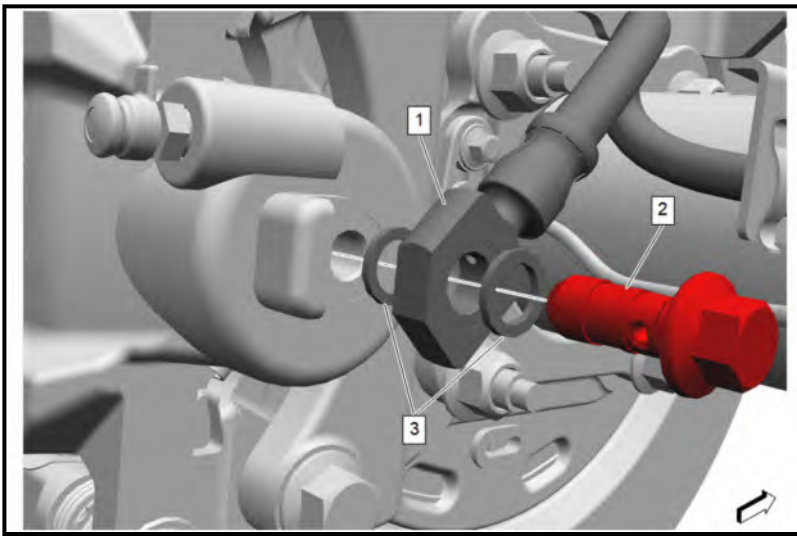
REAR BRAKE CALIPER REPLACEMENT

WARNING: Brake Dust Warning

WARNING: Brake Fluid Irritant Warning

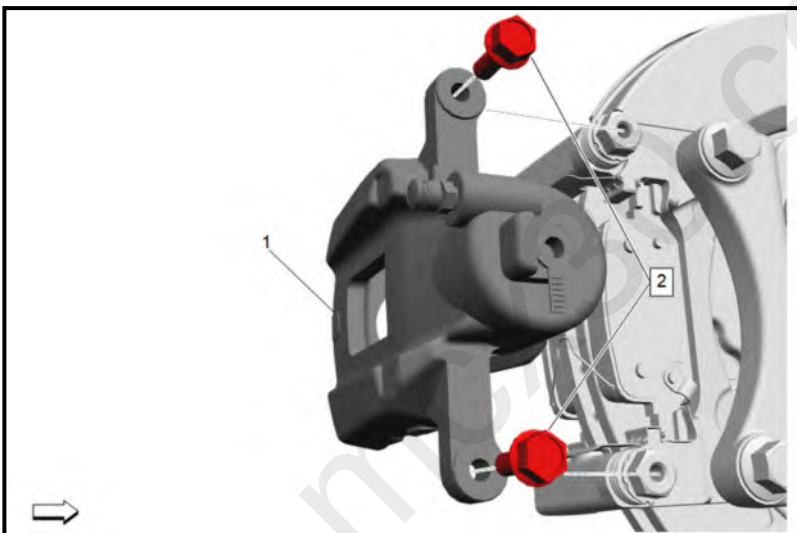
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Clean all dirt and foreign material from the brake hose ends and the brake pipe fitting.
4. Rear Brake Hose Fitting Bolt (2) - Remove



NOTE: Do NOT reuse the rear brake hose fitting gaskets.

5. Rear Brake Hose Fitting Gasket (3) - Remove and DISCARD [2x]
6. Rear Brake Hose (1) @ Rear Brake Caliper - Remove
7. Cap the rear brake hose outlet to prevent brake fluid loss and contamination.
8. Rear Brake Caliper Guide Pin Bolt (2) - Remove [2x]

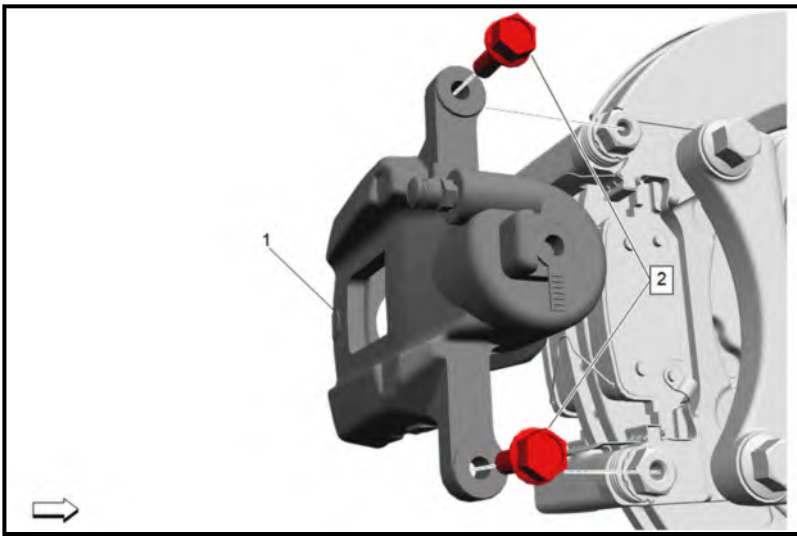


NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

9. Rear Brake Caliper (1) - Remove

Installation Procedure

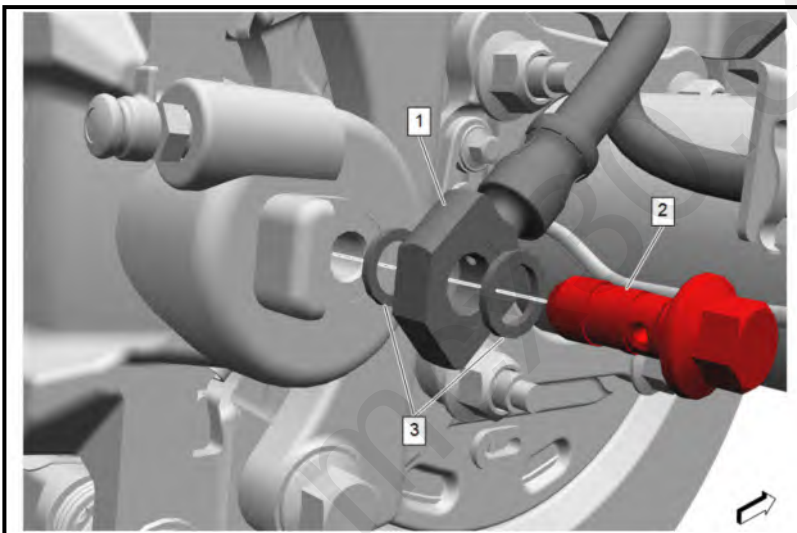
1. Rear Brake Caliper (1) - Install



CAUTION: Fastener Caution

NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

2. Rear Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] 40 N.m (30 lb ft)
3. Remove the cap from the rear brake hose outlet.



4. Rear Brake Hose Fitting Gasket (3) - Install NEW [2x]
5. Rear Brake Hose (1) @ Rear Brake Caliper - Install

NOTE: Refer to the procedure link for torque specification.

6. Rear Brake Hose Fitting Bolt (2) - Install and tighten - [Rear Brake Hose Replacement](#) , or [Rear Brake Hose Replacement \(Frame to Axle\)](#) , or [Rear Brake Hose Replacement \(Axle to Caliper\)](#).
7. Bleed the brake system. [Hydraulic Brake System Bleeding \(Manual\)](#) , or [Hydraulic Brake System Bleeding \(Pressure\)](#).
8. Install the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
9. Remove the support and lower the vehicle.

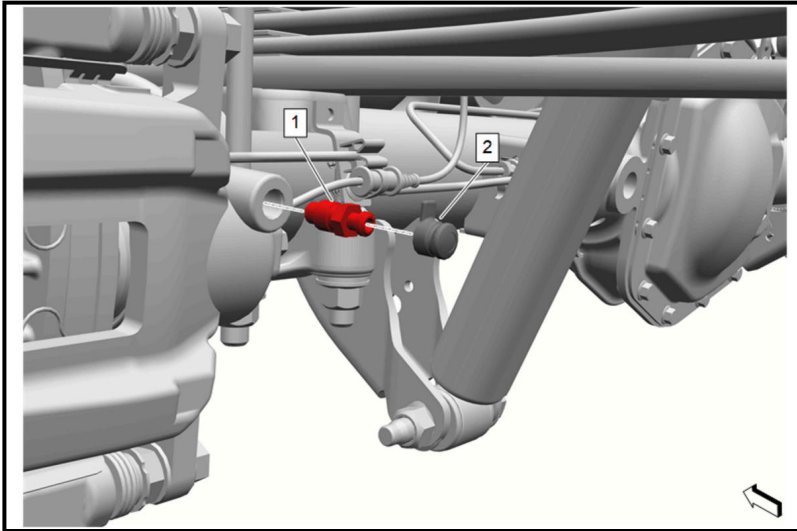
REAR BRAKE BLEEDER VALVE REPLACEMENT

WARNING: Brake Dust Warning

WARNING: Brake Fluid Irritant Warning

Removal Procedure

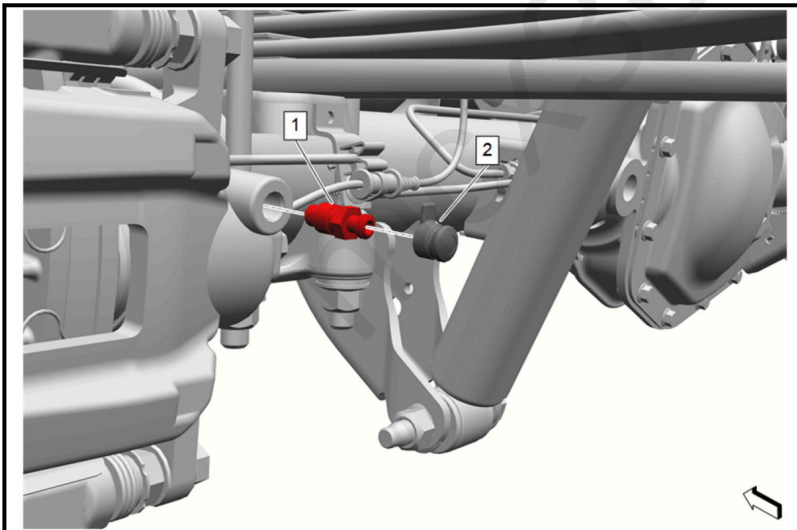
1. Raise and support the vehicle. Lifting and Jacking the Vehicle
2. Remove the rear tire and wheel assembly. Tire and Wheel Removal and Installation
3. Rear Brake Bleeder Valve Cap (2) - Remove



4. Rear Brake Bleeder Valve (1) - Remove

Installation Procedure

1. Rear Brake Bleeder Valve (1) - Install and tighten 17 N.m (13 lb ft)



CAUTION: Component Fastener Tightening Caution

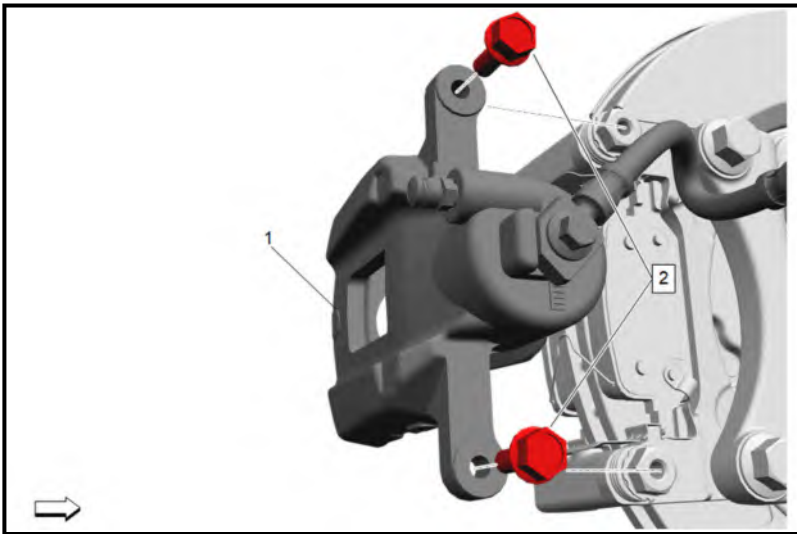
2. Rear Brake Bleeder Valve Cap (2) - Install
3. Install the rear tire and wheel assembly. Tire and Wheel Removal and Installation
4. Remove the support and lower the vehicle.

REAR BRAKE CALIPER GUIDE PIN REPLACEMENT

WARNING: Brake Dust Warning

Removal Procedure

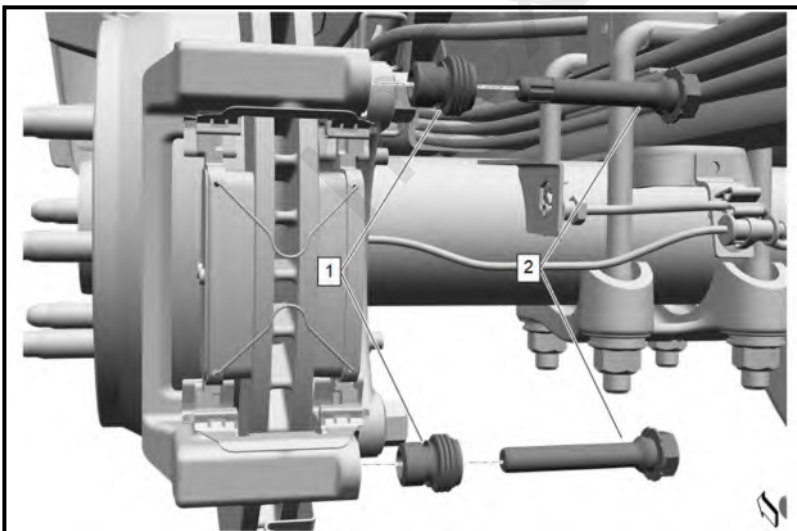
1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Rear Brake Caliper Guide Pin Bolt (2) - Remove [2x]



NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

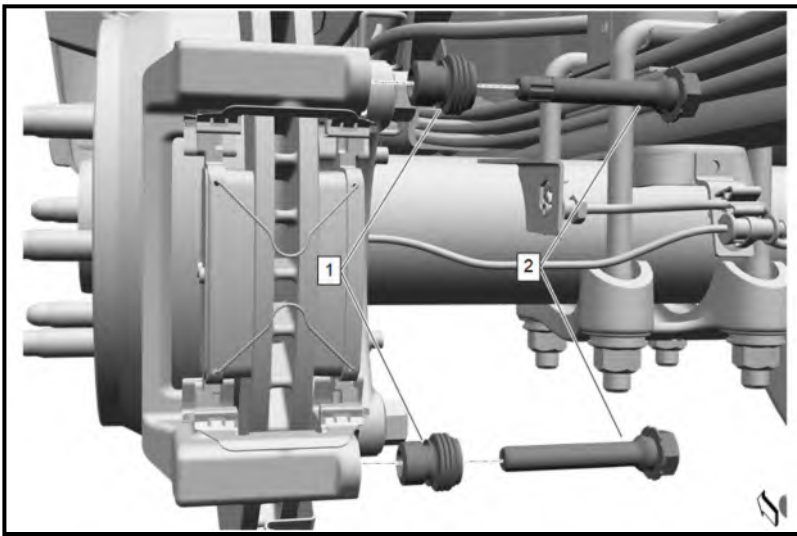
4. Remove the brake caliper and support with heavy mechanics wire. (1)
5. Rear Brake Caliper Guide Pin (2) - Remove [2x]



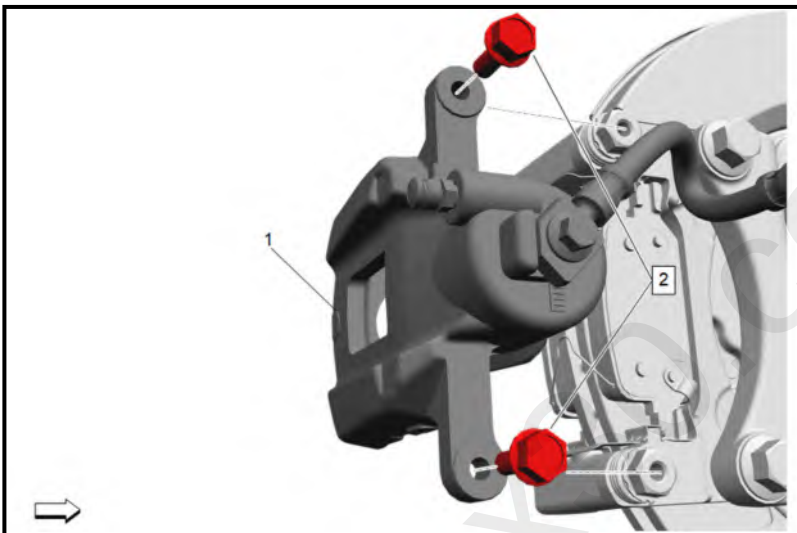
6. Rear Brake Caliper Guide Pin Boot (1) - Remove [2x]

Installation Procedure

1. Rear Brake Caliper Guide Pin Boot (1) - Install [2x]



2. Rear Brake Caliper Guide Pin (2) - Install [2x]
3. Rear Brake Caliper (1) - Install



CAUTION: Fastener Caution

NOTE: Refer to the procedure link for torque specification.

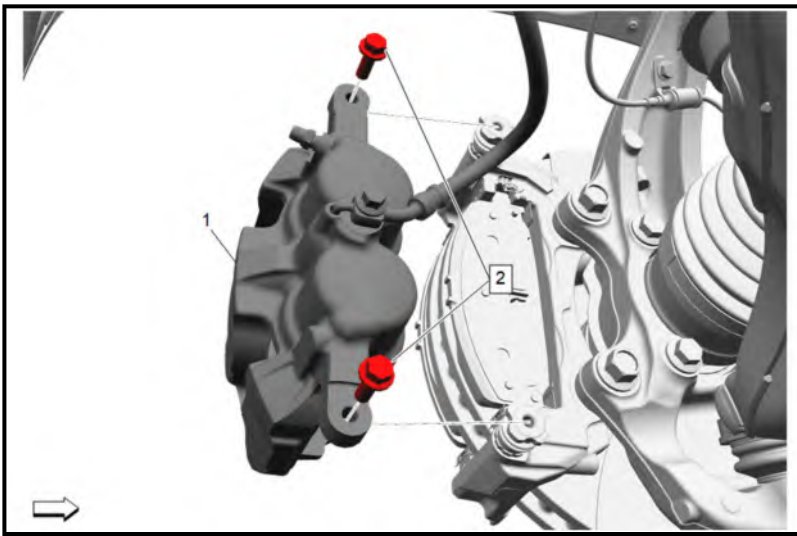
4. Rear Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] - [Rear Brake Caliper Replacement](#)
5. Install the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
6. Remove the support and lower the vehicle.

FRONT BRAKE CALIPER BRACKET REPLACEMENT

WARNING: Brake Dust Warning

Removal Procedure

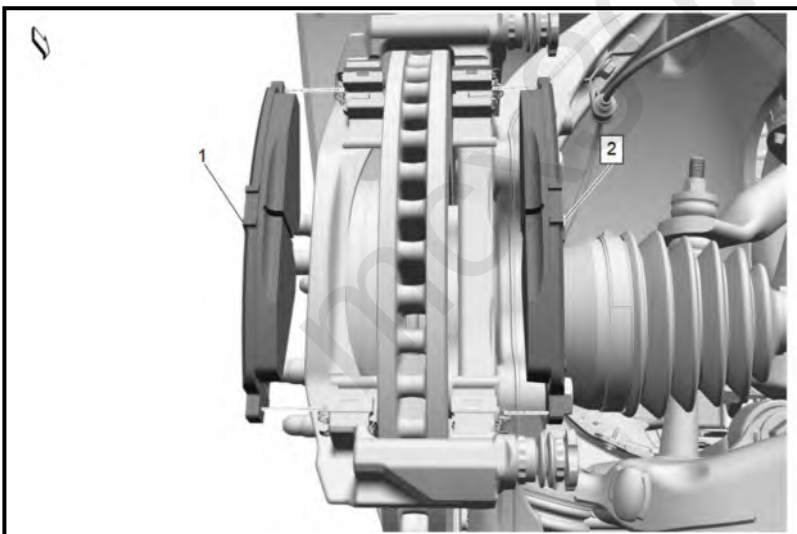
1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Front Brake Caliper Guide Pin Bolt (2) - Remove [2x]



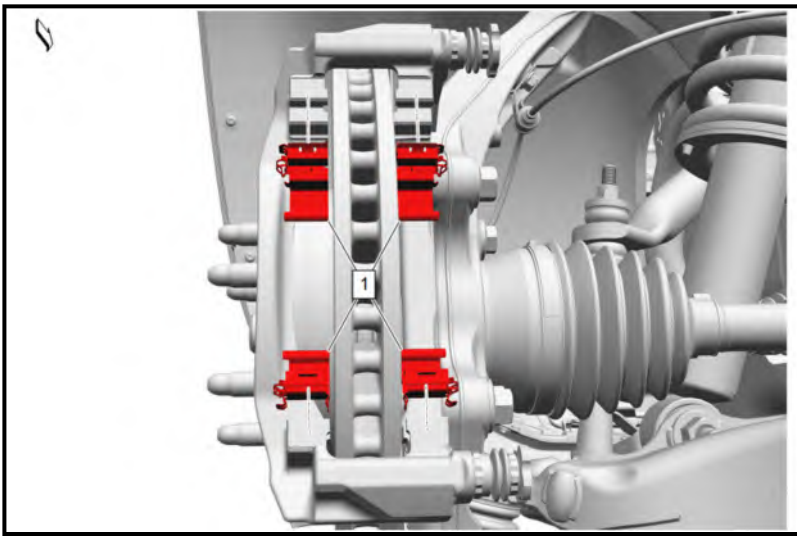
NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

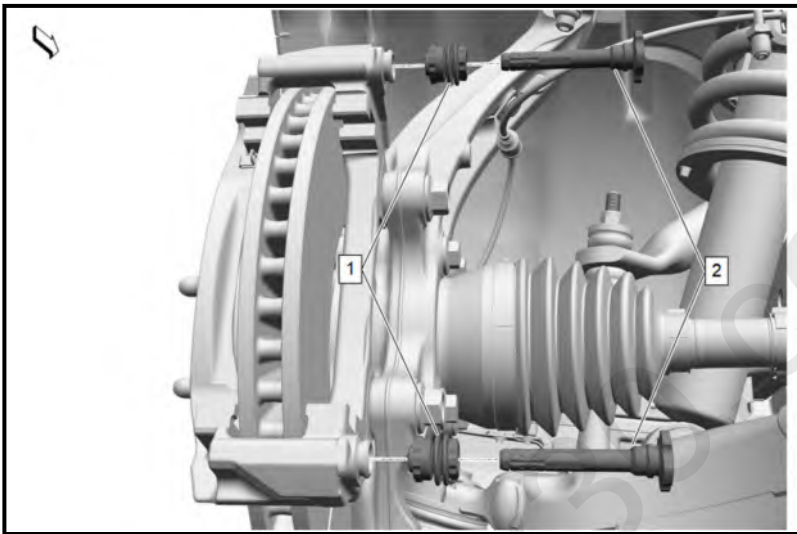
4. Remove the brake caliper and support with heavy mechanics wire. (1)
5. Front Disc Brake Outer Pad (1) - Remove



6. Front Disc Brake Inner Pad (2) - Remove
7. Front Disc Brake Pad Retaining Spring (1) - Remove [4x]

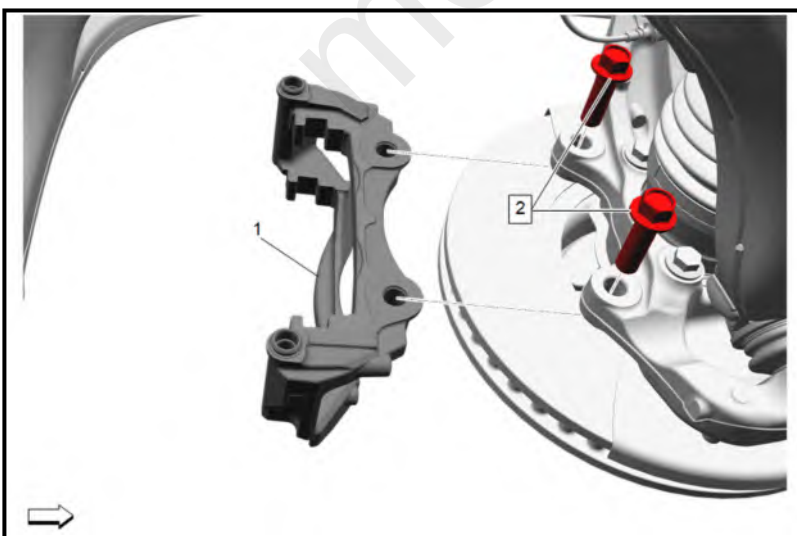


8. Front Brake Caliper Guide Pin (2) - Remove [2x]



9. Front Brake Caliper Guide Pin Boot (1) - Remove [2x]

10. Front Brake Caliper Bolt (2) - Remove [2x]

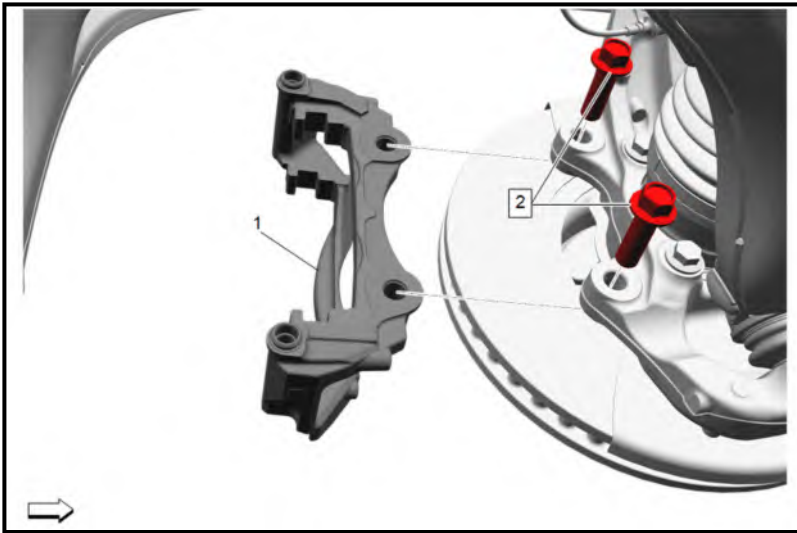


11. Front Brake Caliper Bracket (1) - Remove

Installation Procedure

1. If NEW threaded components are being installed, loosen the adhesive using a metal pick or similar tool before proceeding. If threaded components are reused, prepare the threaded components using the

following steps:

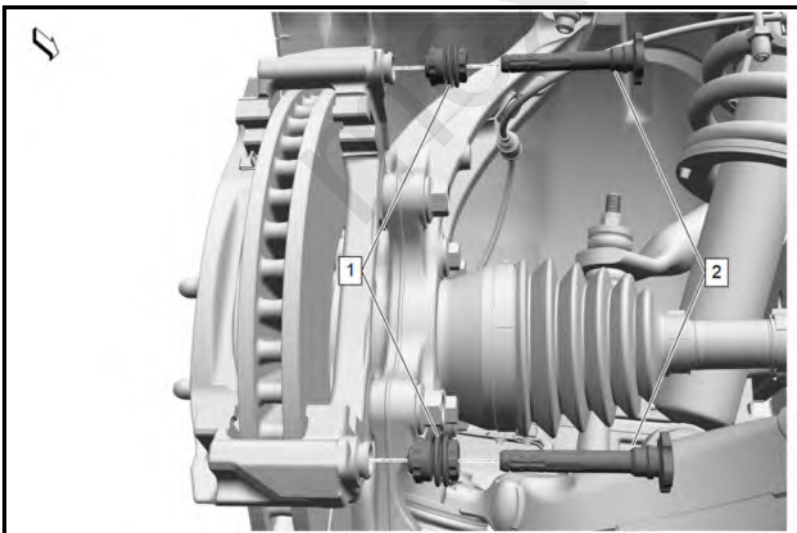


1. Remove any loose cured adhesive from the external threads of the components using a lint free cloth.
2. Thread the cleaned components into the internal mating threads and remove to loosen trapped cured adhesive.
3. Apply thread locking adhesive to the external threads of the components. [Adhesives, Fluids, Lubricants, and Sealers](#)
4. Ensure there are no gaps in the thread locking adhesive once applied to the component.

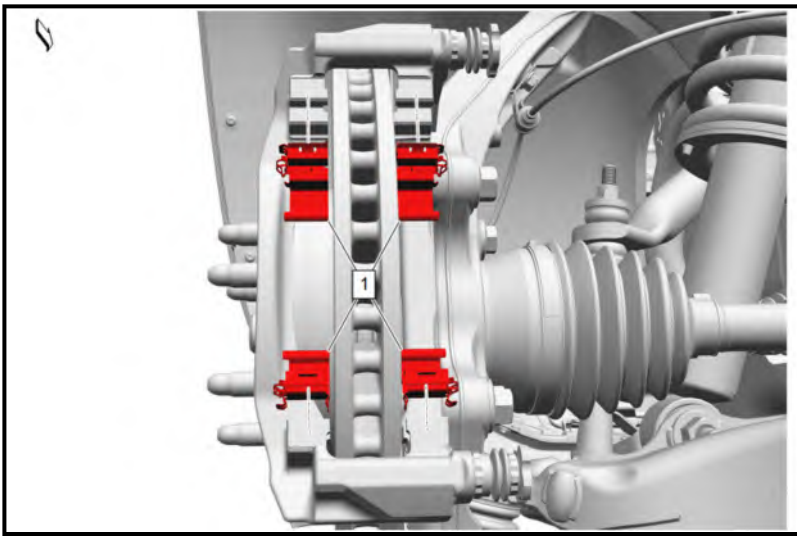
2. Front Brake Caliper Bracket - (1) Install

CAUTION: [Fastener Caution](#)

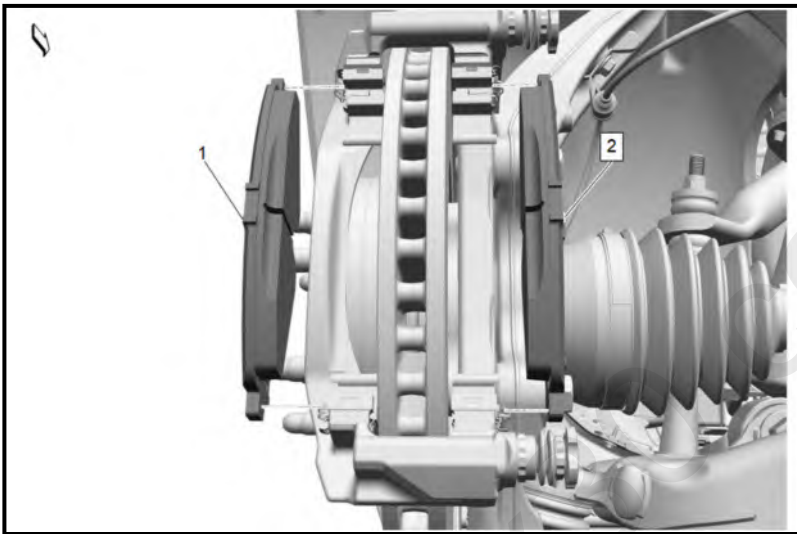
3. Front Brake Caliper Bolt (2) - Install and tighten [2x] 180 N.m (133 lb ft)
4. Front Brake Caliper Guide Pin Boot (1) - Install [2x]



5. Front Brake Caliper Guide Pin (2) - Install [2x]
6. Front Disc Brake Pad Retaining Spring (1) - Install [4x]

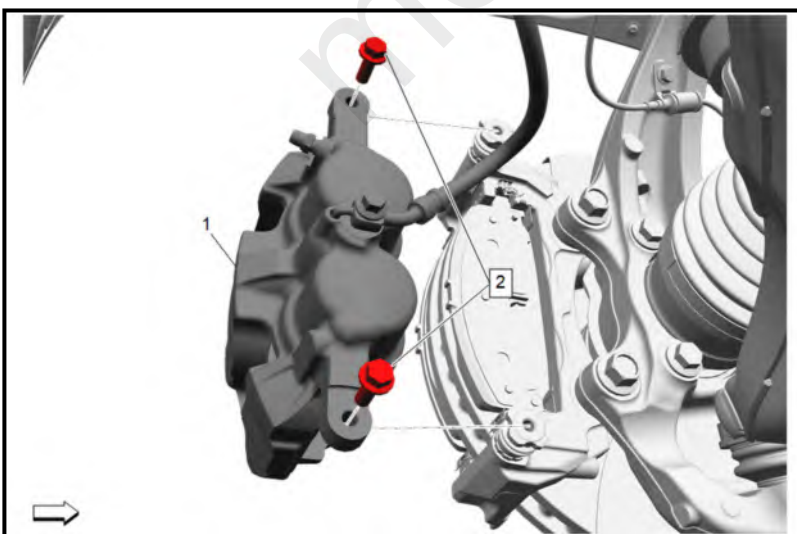


7. Front Disc Brake Inner Pad (2) - Install



8. Front Disc Brake Outer Pad (1) - Install

9. Front Brake Caliper (1) - Install



NOTE: Refer to the procedure link for torque specification.

10. Front Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] - [Front Brake Caliper Replacement](#)

11. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)

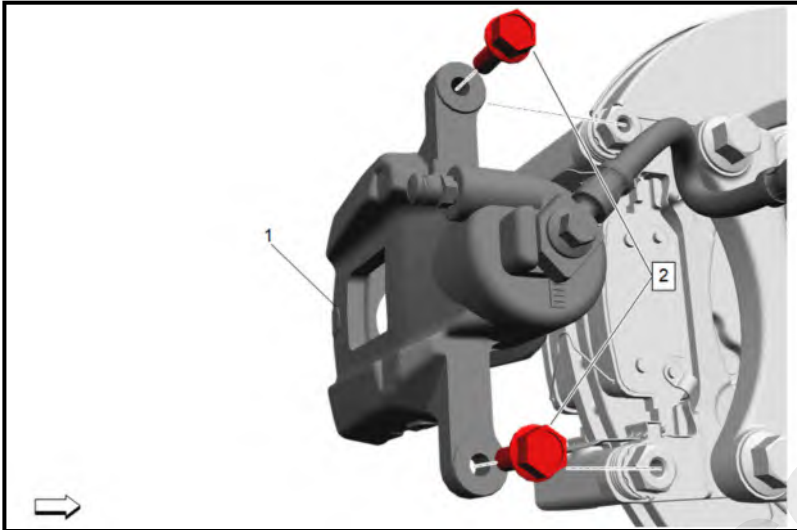
12. Remove the support and lower the vehicle.

REAR BRAKE CALIPER BRACKET REPLACEMENT

WARNING: Brake Dust Warning

Removal Procedure

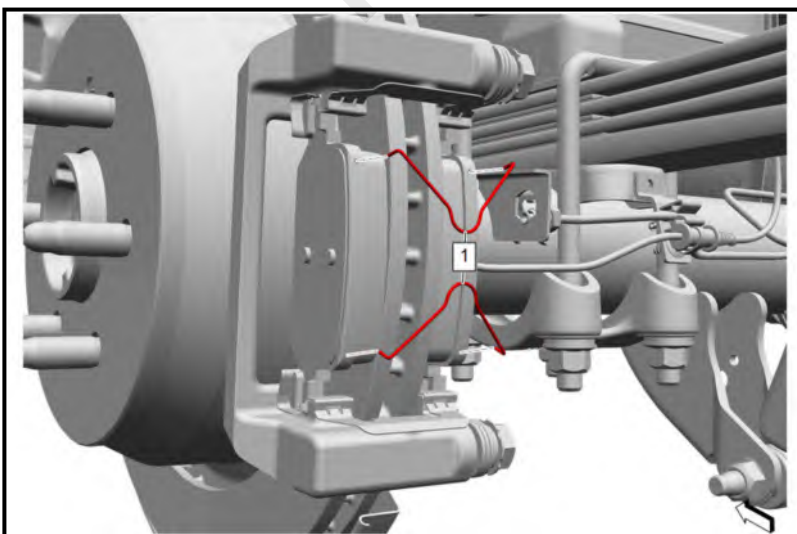
1. Raise and support the vehicle. Lifting and Jacking the Vehicle
2. Remove the rear tire and wheel assembly. Tire and Wheel Removal and Installation
3. Rear Brake Caliper Guide Pin Bolt (2) - Remove [2x]



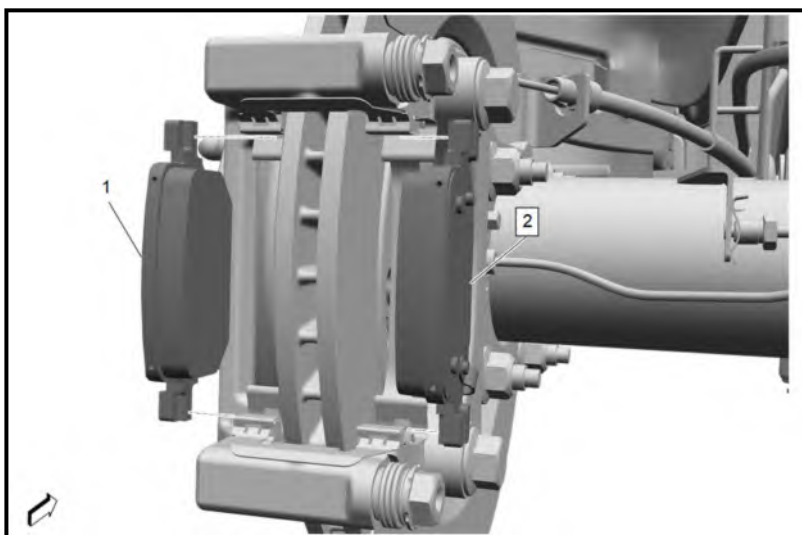
NOTE: Do NOT use air tools to remove or install the guide pin bolts. Use hand tools ONLY.

CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

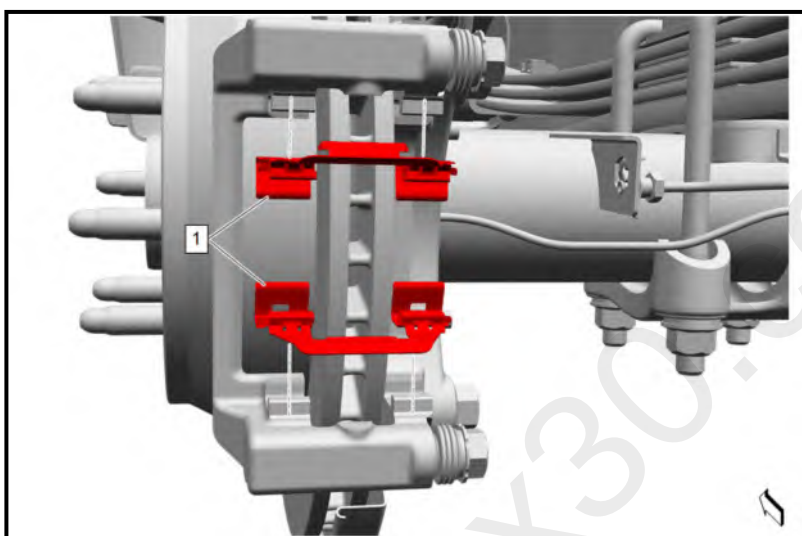
4. Remove the brake caliper and support with heavy mechanics wire. (1)
5. Rear Disc Brake Pad Spring (1) - Remove [2x]



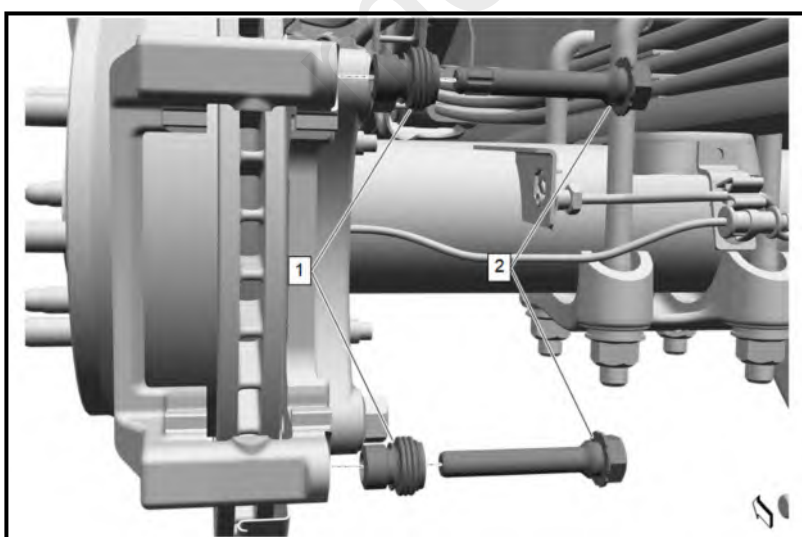
6. Rear Disc Brake Pad- Outer (1) - Remove



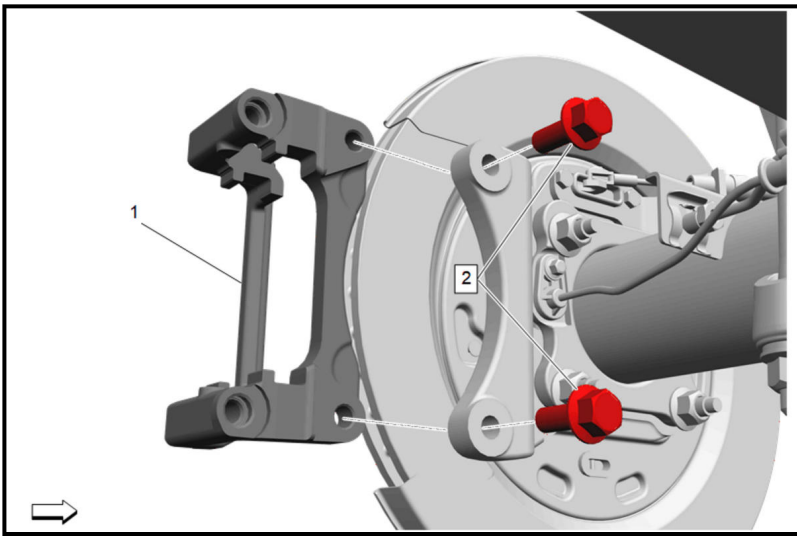
- 7. Rear Disc Brake Pad- Inner (2) - Remove
- 8. Rear Disc Brake Pad Retainer (1) - Remove [2x]



- 9. Rear Brake Caliper Guide Pin (2) - Remove [2x]



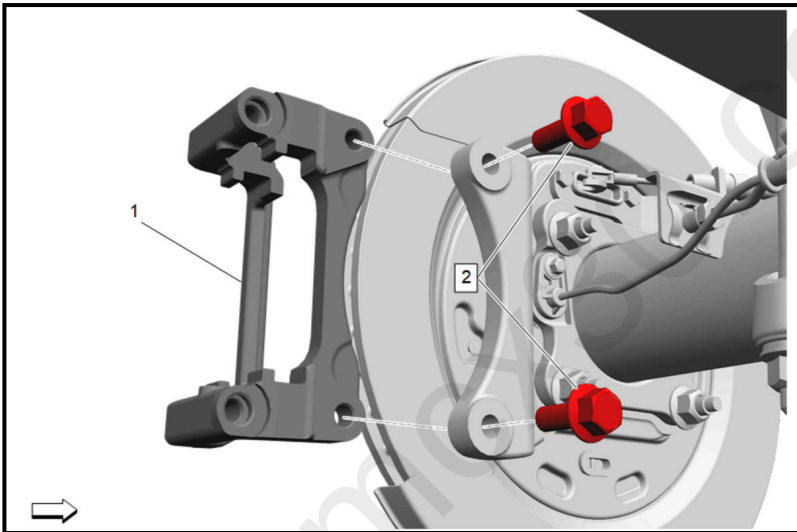
- 10. Rear Brake Caliper Guide Pin Boot (1) - Remove [2x]
- 11. Rear Brake Caliper Bracket Bolt (2) - Remove [2x]



12. Rear Brake Caliper Bracket (1) - Remove

Installation Procedure

1. If NEW threaded components are being installed, loosen the adhesive using a metal pick or similar tool before proceeding. If threaded components are reused, prepare the threaded components using the following steps:

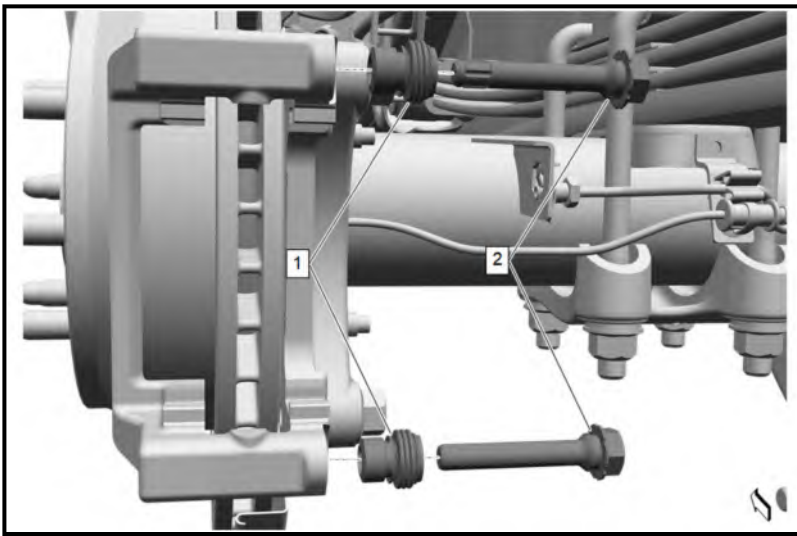


1. Remove any loose cured adhesive from the external threads of the components using a lint free cloth.
2. Thread the cleaned components into the internal mating threads and remove to loosen trapped cured adhesive.
3. Apply thread locking adhesive to the external threads of the components. **Adhesives, Fluids, Lubricants, and Sealers**
4. Ensure there are no gaps in the thread locking adhesive once applied to the component.

2. Rear Brake Caliper Bracket (1) - Install

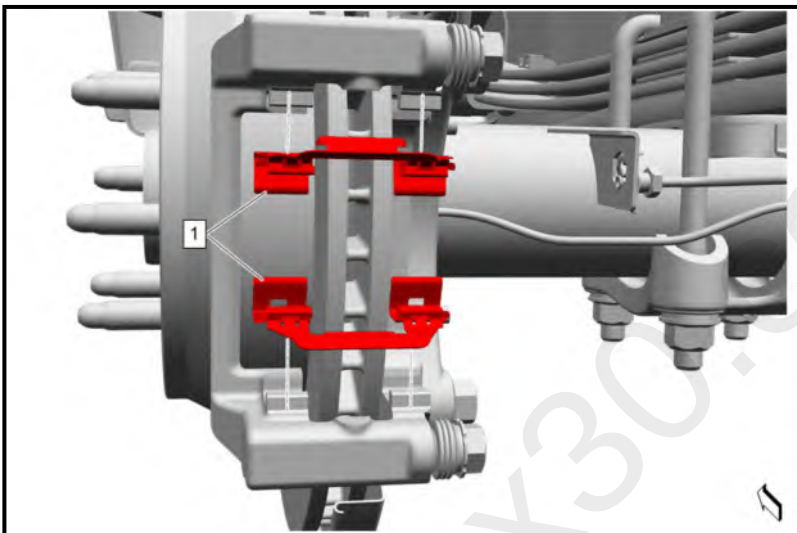
CAUTION: **Fastener Caution**

3. Rear Brake Caliper Bracket Bolt (2) - Install and tighten [2x]
 - First Pass: 100 N.m (74 lb ft)
 - Final Pass: **15 - 30 degrees**
4. Rear Brake Caliper Guide Pin Boot (1) - Install [2x]

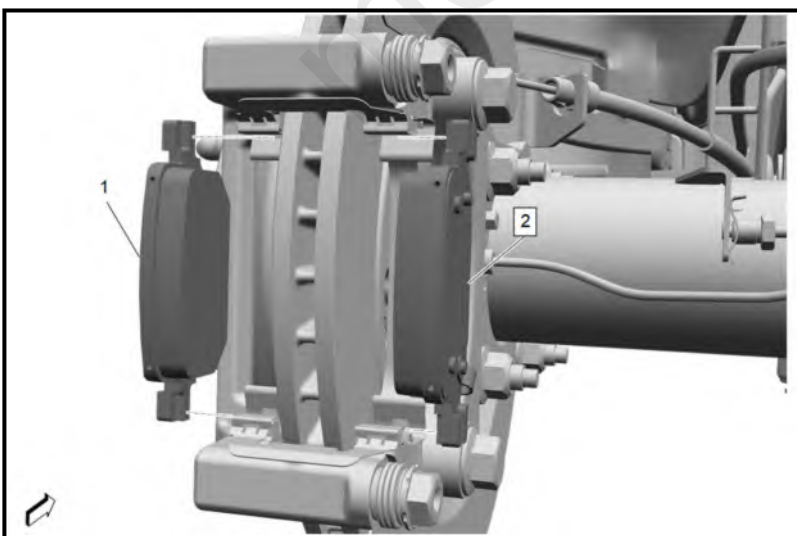


5. Rear Brake Caliper Guide Pin (2) - Install [2x]

6. Rear Disc Brake Pad Retainer (1) - Install [2x]

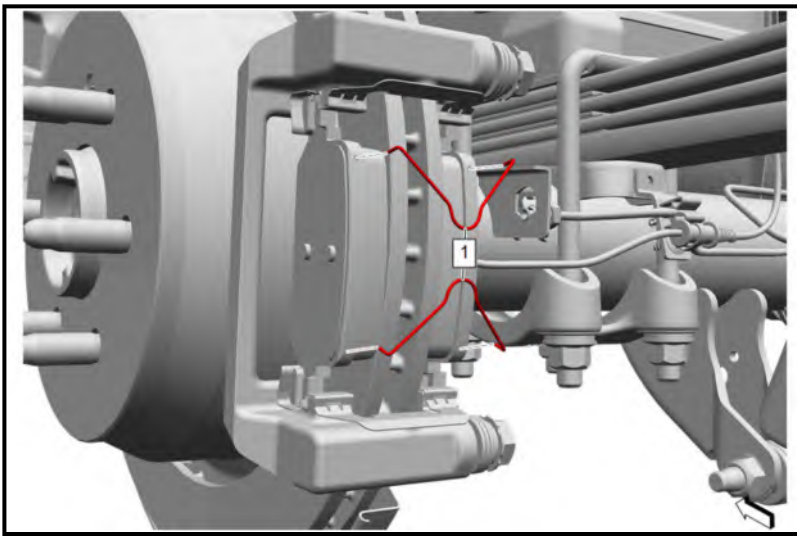


7. Rear Disc Brake Pad- Inner (2) - Install

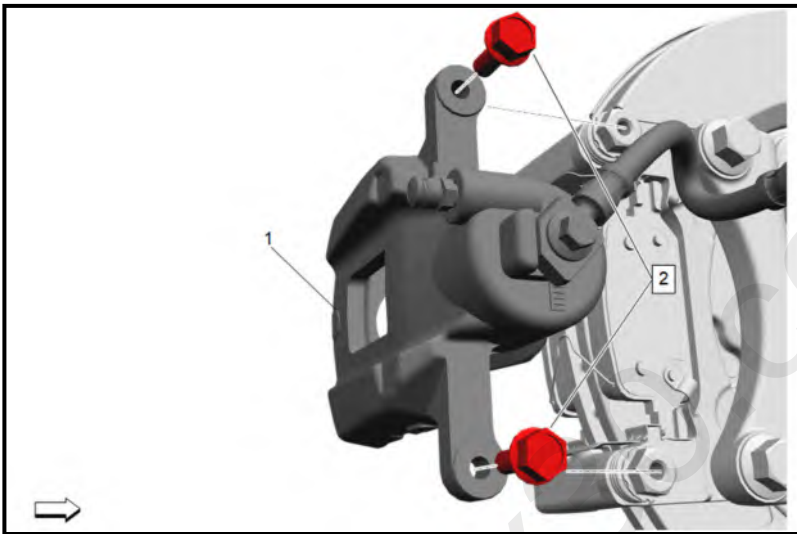


8. Rear Disc Brake Pad- Outer (1) - Install

9. Rear Disc Brake Pad Spring (1) - Install [2x]



10. Rear Brake Caliper (1) - Install



NOTE: Refer to the procedure link for torque specification.

11. Rear Brake Caliper Guide Pin Bolt (2) - Install and tighten [2x] - [Rear Brake Caliper Replacement](#)
12. Install the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
13. Remove the support and lower the vehicle.

FRONT BRAKE ROTOR REPLACEMENT

Special Tools

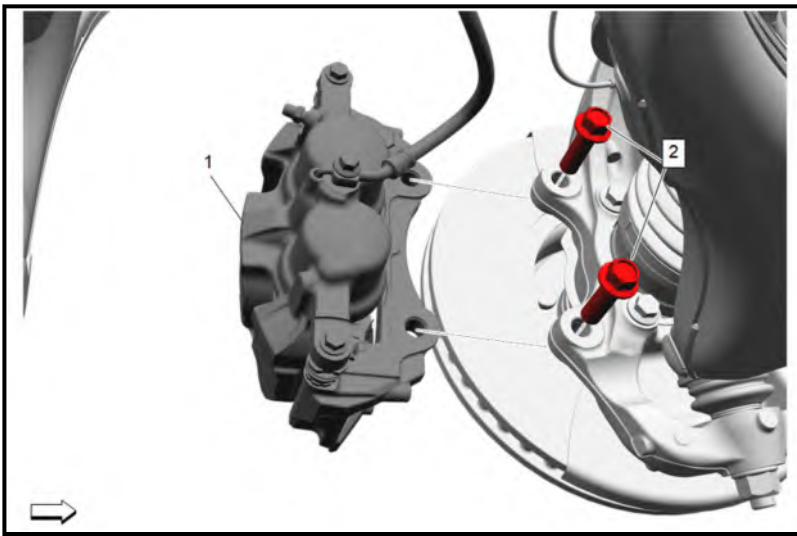
- CH-41013 Rotor Resurfacing Kit
- CH-42450-A Wheel Hub Resurfacing Kit

Equivalent regional tools: [Special Tools](#)

WARNING: [Brake Dust Warning](#) .

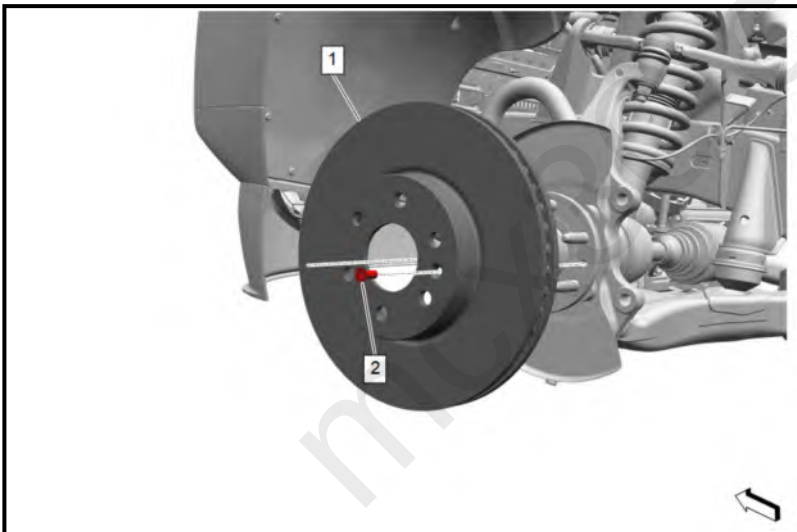
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Front Brake Caliper Bolt (2) - Remove [2x]



CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

4. Remove the front brake caliper and bracket and assembly (1) and support with heavy mechanics wire.
5. Front Brake Rotor Bolt (2) - Remove



NOTE: If installing the original brake rotor, mark the relationship of the rotor to the hub.

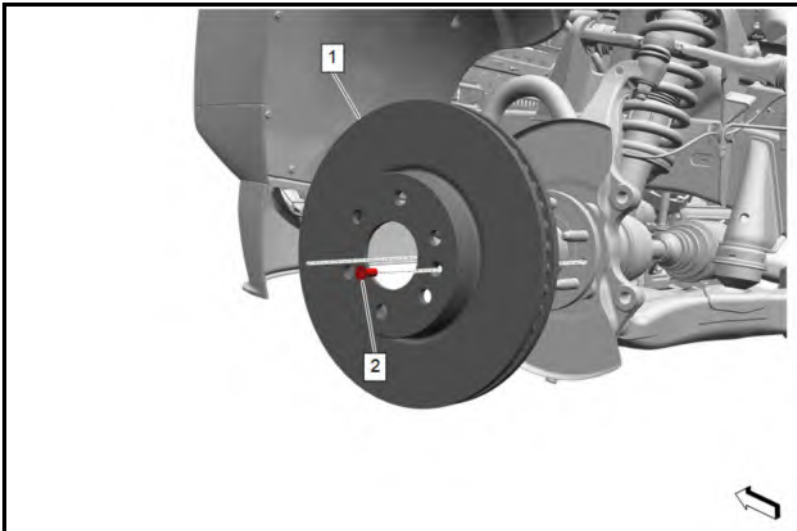
6. Front Brake Rotor (1) - Remove

Installation Procedure

CAUTION: Whenever the rotor has been separated from the axle flange, clean any rust or foreign material from the mating surface of the axle flange and brake rotor. Failure to do this may result in increased lateral runout of the rotor and brake pulsation.

1. Using **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
2. Using **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.

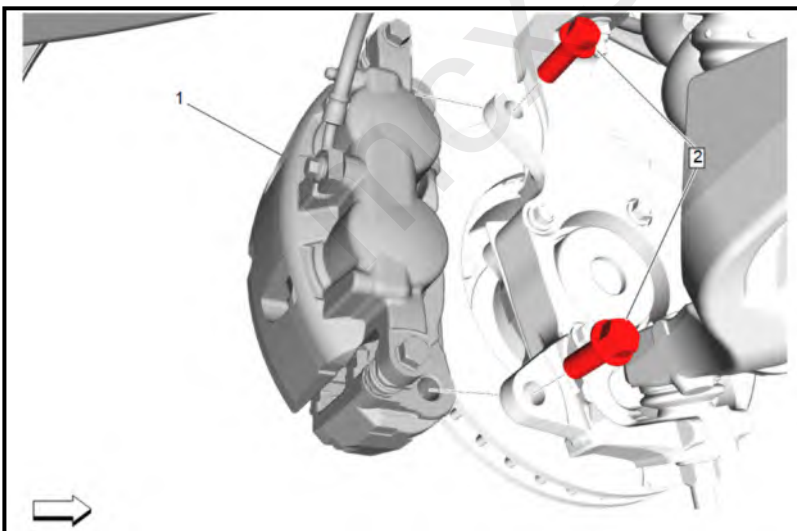
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure there are no foreign particles or debris remaining.
4. If installing a NEW brake rotor, clean the friction surfaces of the brake rotor with denatured alcohol.
5. Front Brake Rotor (1) - Install



NOTE: If installing the original brake rotor, align the relationship mark made during removal.

CAUTION: Refer to [Fastener Caution](#) .

6. Front Brake Rotor Bolt (2) - Install and tighten 9 N.m (80 lb in)
7. If NEW threaded components are being installed, loosen the adhesive using a metal pick or similar tool before proceeding. If threaded components are reused, prepare the threaded components using the following steps:



1. Remove any loose cured adhesive from the external threads of the components using a lint free cloth.
 2. Thread the cleaned components into the internal mating threads and remove to loosen trapped cured adhesive.
 3. Apply thread locking adhesive to the external threads of the components. [Adhesives, Fluids, Lubricants, and Sealers](#)
 4. Ensure there are no gaps in the thread locking adhesive once applied to the component.
8. Install the brake caliper and bracket assembly. (1)

NOTE: Refer to the procedure link for torque specification.

9. Front Brake Caliper Bolt (2) - Install and tighten [2x] - [Front Brake Caliper Bracket Replacement](#)
10. Install the front tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
11. Remove the supports and lower the vehicle.
12. Burnish the brake pads and rotors. [Brake Pad and Rotor Burnishing](#).

REAR BRAKE ROTOR REPLACEMENT

Special Tools

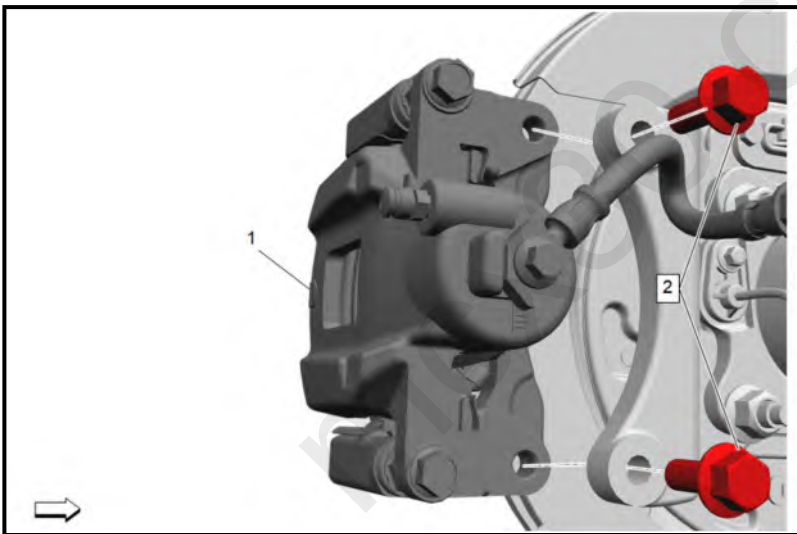
- CH-41013 Rotor Resurfacing Kit
- CH-42450-A Wheel Hub Resurfacing Kit

Equivalent regional tools: [Special Tools](#)

WARNING: [Brake Dust Warning](#)

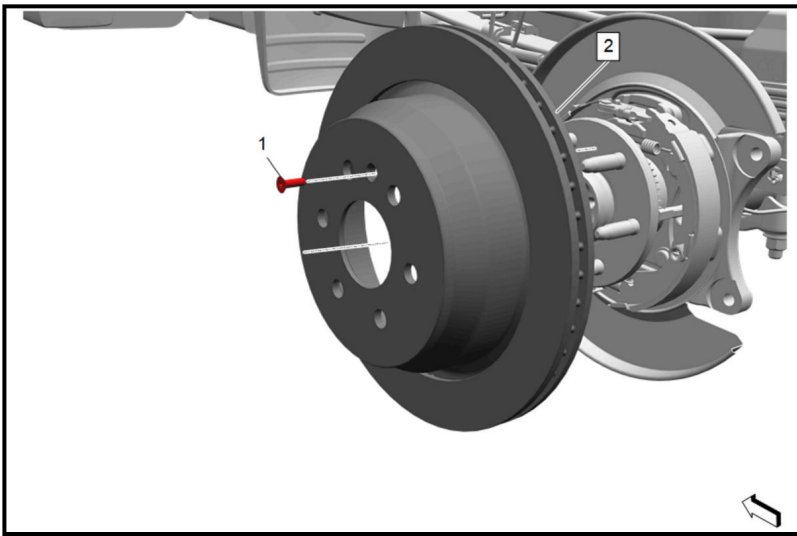
Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Remove the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
3. Rear Brake Caliper Bracket Bolt (2) - Remove [2x]



CAUTION: Support the brake caliper with heavy mechanic wire, or equivalent, whenever it is separated from its mount and the hydraulic flexible brake hose is still connected. Failure to support the caliper in this manner will cause the flexible brake hose to bear the weight of the caliper, which may cause damage to the brake hose and in turn may cause a brake fluid leak.

4. Remove the rear brake caliper and bracket assembly (1) and support with heavy mechanics wire.
5. Rear Brake Rotor Bolt (1) - Remove



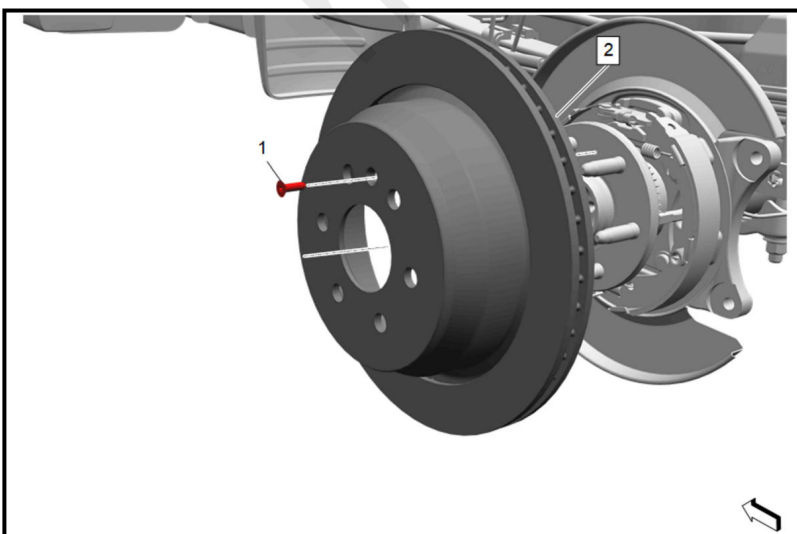
NOTE: If installing the original brake rotor, mark the relationship of the rotor to the hub.

6. Rear Brake Rotor (2) - Remove

Installation Procedure

NOTE: Whenever the brake rotor has been separated from the hub/axle flange, any rust or contaminants should be cleaned from the hub/axle flange and the brake rotor mating surfaces. Failure to do this may result in excessive assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.

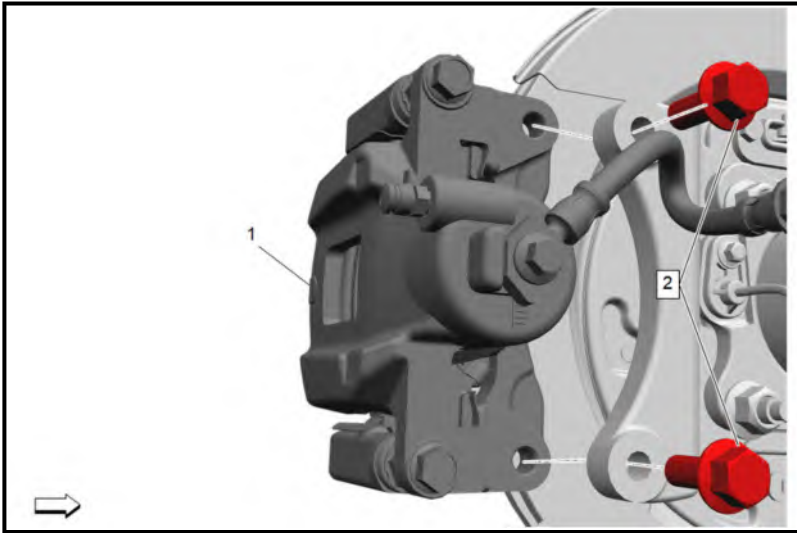
1. Using **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
2. Using **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure there are no foreign particles or debris remaining.
4. Rear Brake Rotor (1) - Install



NOTE: If installing the original brake rotor, align the relationship mark made during removal.

CAUTION: Fastener Caution

5. Rear Brake Rotor Bolt (1) - Install and tighten 9 N.m (80 lb in)
6. If NEW threaded components are being installed, loosen the adhesive using a metal pick or similar tool before proceeding. If threaded components are reused, prepare the threaded components using the following steps:



1. Remove any loose cured adhesive from the external threads of the components using a lint free cloth.
 2. Thread the cleaned components into the internal mating threads and remove to loosen trapped cured adhesive.
 3. Apply thread locking adhesive to the external threads of the components. [Adhesives, Fluids, Lubricants, and Sealers](#)
 4. Ensure there are no gaps in the thread locking adhesive once applied to the component.
7. Rear Brake Caliper and Bracket Assembly (2) - Install

NOTE: Refer to the procedure link for torque specification.

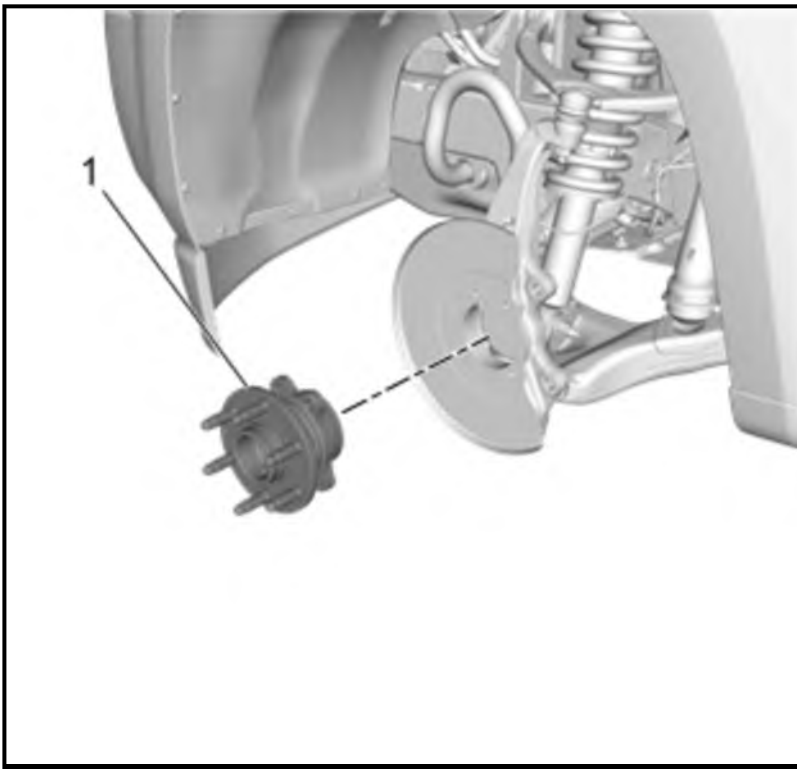
8. Rear Brake Caliper Bracket Bolt (1) - Install and tighten [2x] - [Rear Brake Caliper Bracket Replacement](#)
9. Install the rear tire and wheel assembly. [Tire and Wheel Removal and Installation](#)
10. Remove the supports and lower the vehicle.
11. Burnish the brake pads and rotors. [Brake Pad and Rotor Burnishing](#).

FRONT BRAKE SHIELD REPLACEMENT

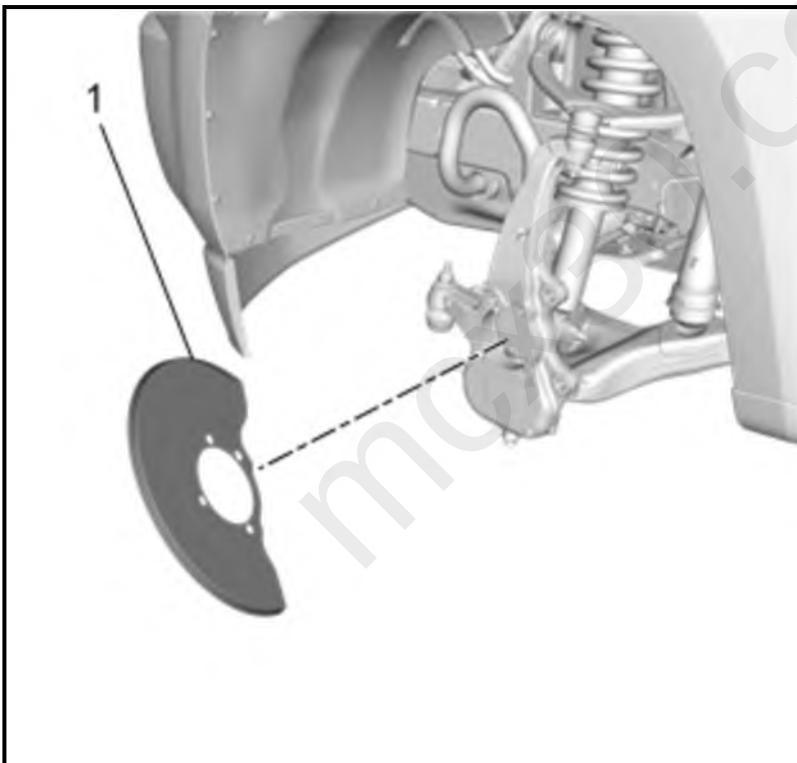
Removal Procedure

WARNING: Refer to [Brake Dust Warning](#) .

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
3. Remove the front wheel bearing and hub assembly (1). Refer to [Front Wheel Bearing and Hub Replacement \(4WD, Without ZR2\)](#) , or [Front Wheel Bearing and Hub Replacement \(2WD, Without ZR2\)](#) , or [Front Wheel Bearing and Hub Replacement \(4WD, With ZR2\)](#) .

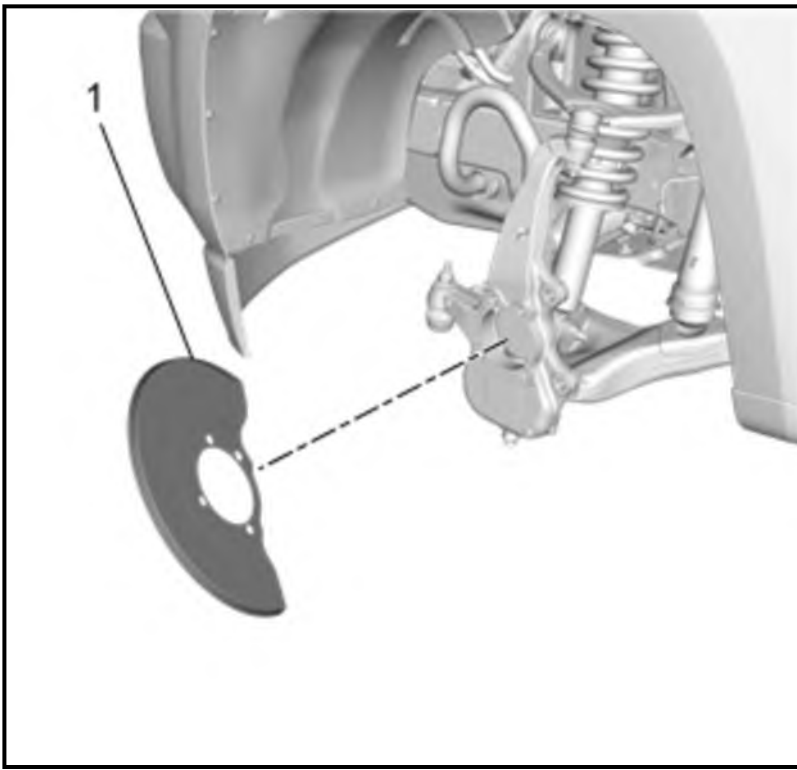


4. Remove the front brake shield (1).

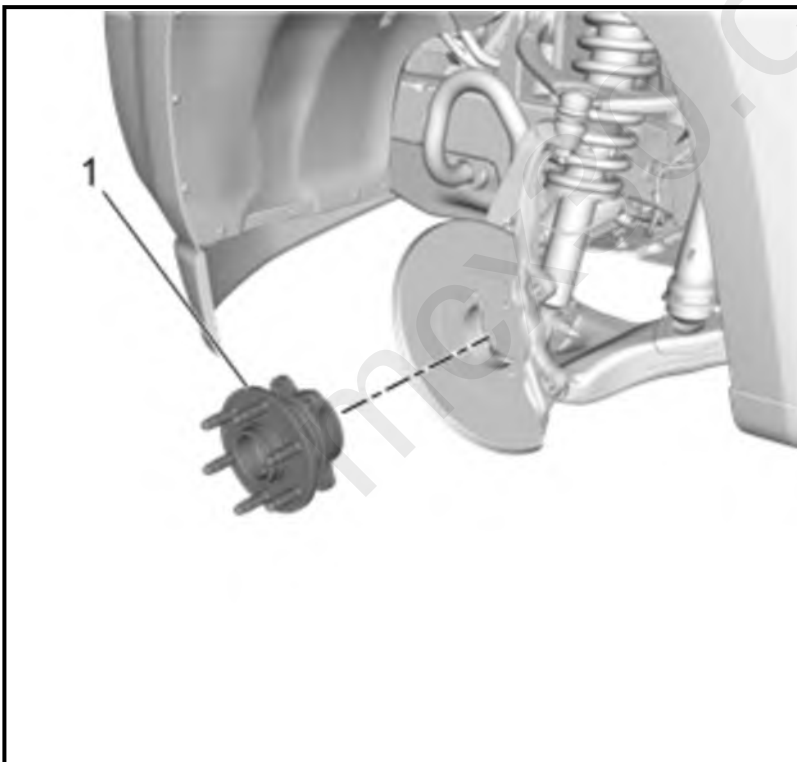


Installation Procedure

1. Install the front brake shield (1).



2. Install the front wheel bearing and hub assembly (1). Refer to [Front Wheel Bearing and Hub Replacement \(4WD, Without ZR2\)](#) , or [Front Wheel Bearing and Hub Replacement \(2WD, Without ZR2\)](#) , or [Front Wheel Bearing and Hub Replacement \(4WD, With ZR2\)](#) .



3. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .

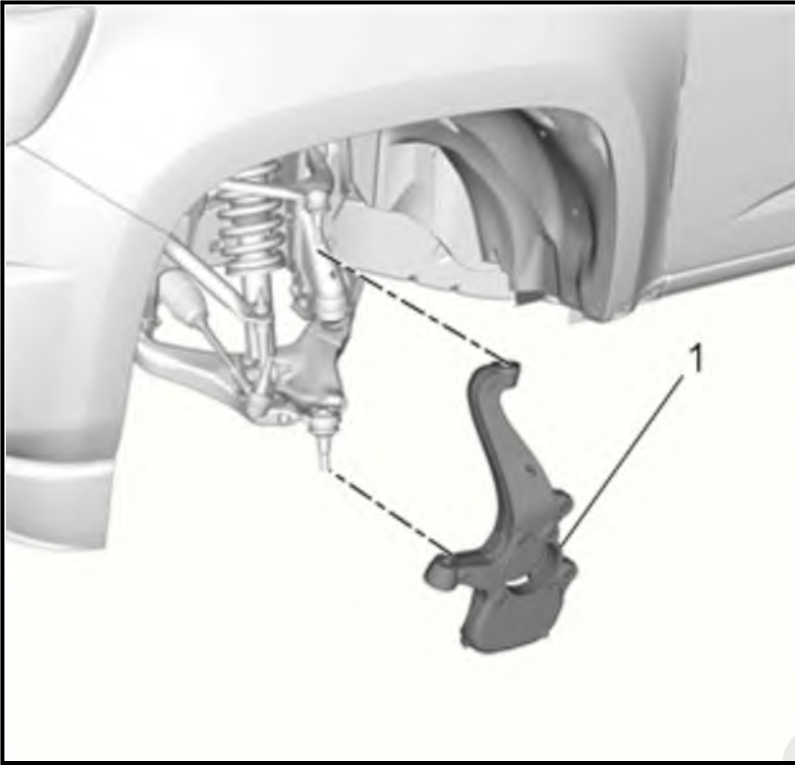
FRONT BRAKE BEARING SHIELD REPLACEMENT

Removal Procedure

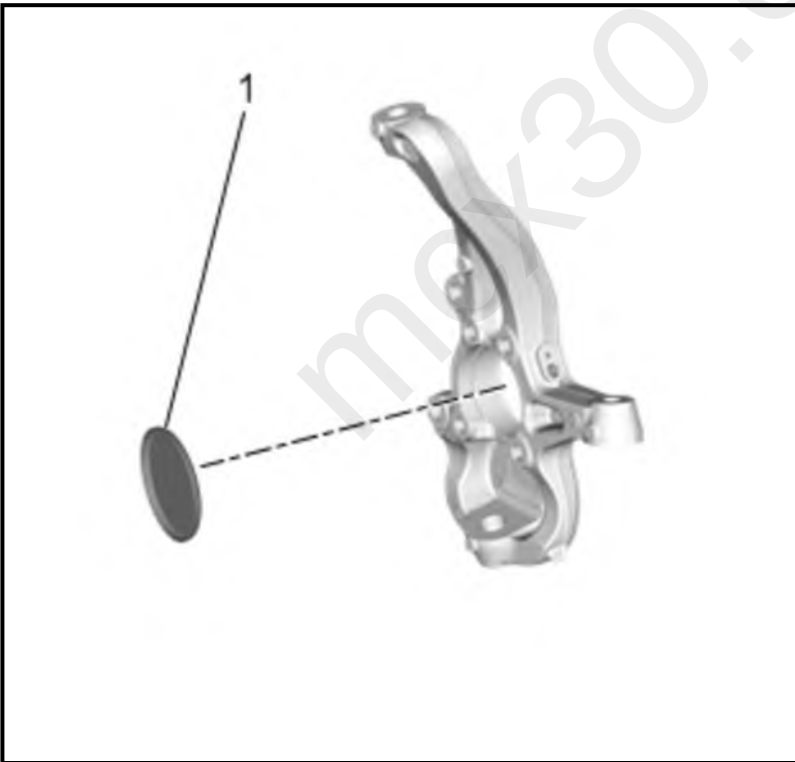
WARNING: Refer to [Brake Dust Warning](#) .

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .

3. Remove the steering knuckle (1). Refer to [Steering Knuckle Replacement \(4WD without ZR2\)](#), or [Steering Knuckle Replacement \(2WD\)](#), or [Steering Knuckle Replacement \(4WD with ZR2\)](#).

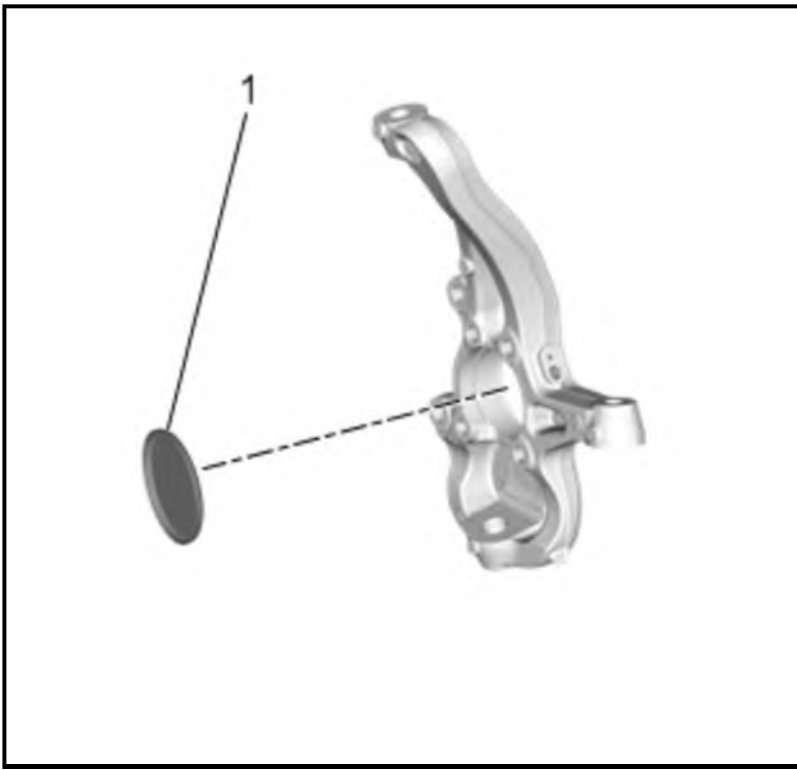


4. Using a hydraulic press, remove the front brake bearing shield (1).



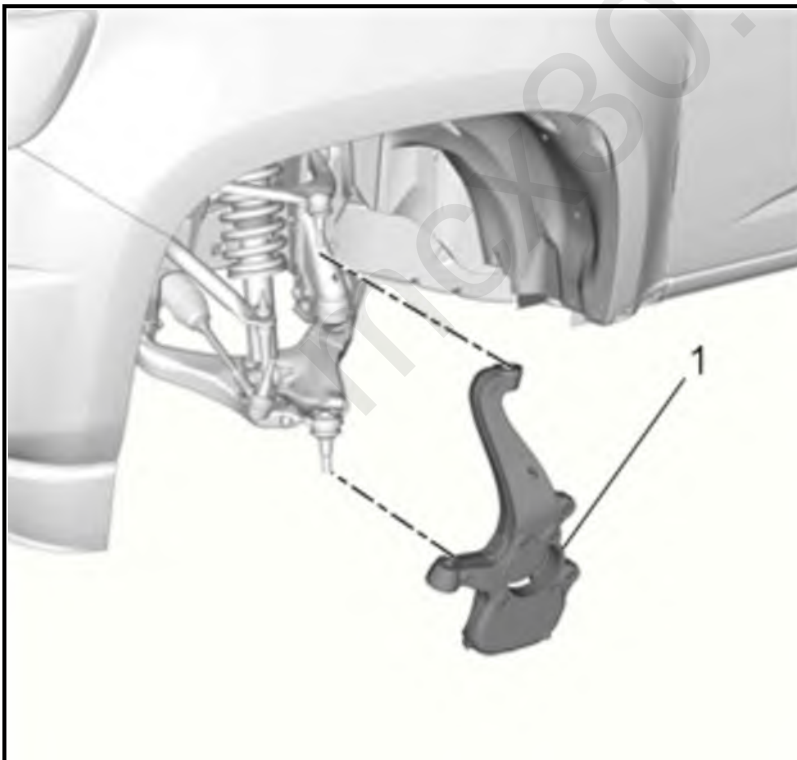
Installation Procedure

1. Using a hydraulic press, install the front brake bearing shield (1).



NOTE: Ensure the front brake bearing shield is fully seated against the ridge in the steering knuckle.

2. Install the steering knuckle (1). Refer to [Steering Knuckle Replacement \(4WD without ZR2\)](#) , or [Steering Knuckle Replacement \(2WD\)](#) , or [Steering Knuckle Replacement \(4WD with ZR2\)](#) .



3. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION

NOTE:

- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. [Brake Rotor Thickness Variation Measurement](#)

- **Brake rotor assembled lateral runout (LRO) exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4, 800 - 11, 300 km (3, 000 - 7, 000 mi).** [Brake Rotor Assembled Lateral Runout Measurement](#)

Review the following acceptable methods for bringing the brake rotor assembled LRO to within specifications. Determine which method to use for the specific vehicle being repaired.

- The indexing method of correcting assembled LRO is most effective when the LRO specification is only exceeded by a relatively small amount: 0.025 - 0.127 mm (0.001 - 0.005 in). Indexing is used to achieve the best possible match of high spots to low spots between related components. [Brake Rotor Assembled Lateral Runout Correction - Indexing](#)
- The on-vehicle brake lathe method is used to bring the LRO to within specifications through compensating for LRO while refinishing the brake rotor. [Brake Rotor Assembled Lateral Runout Correction - On Vehicle Lathe](#)

If the assembled LRO cannot be corrected using these methods, then other components must be suspected as causing and/or contributing to the LRO concern.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - INDEXING

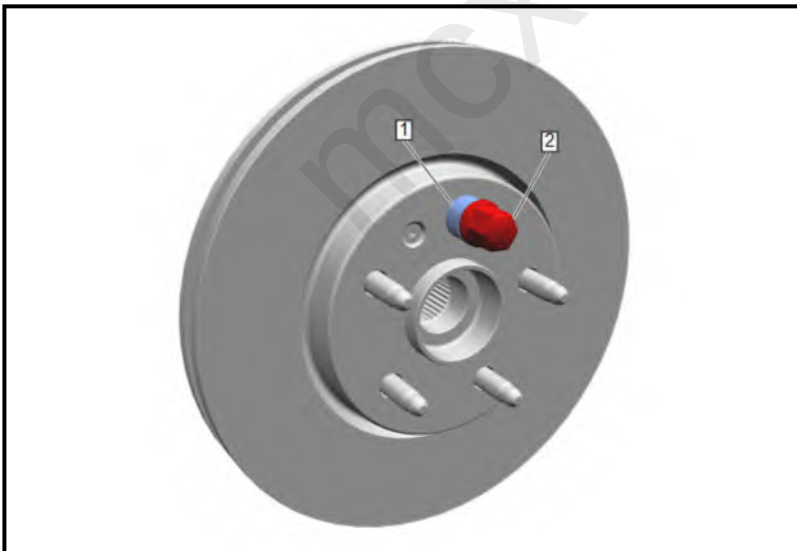
NOTE: This Procedure is not used in Europe

Special Tools

CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to [Special Tools](#).

1. Remove the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts that were installed during the assembled LRO measurement procedure.



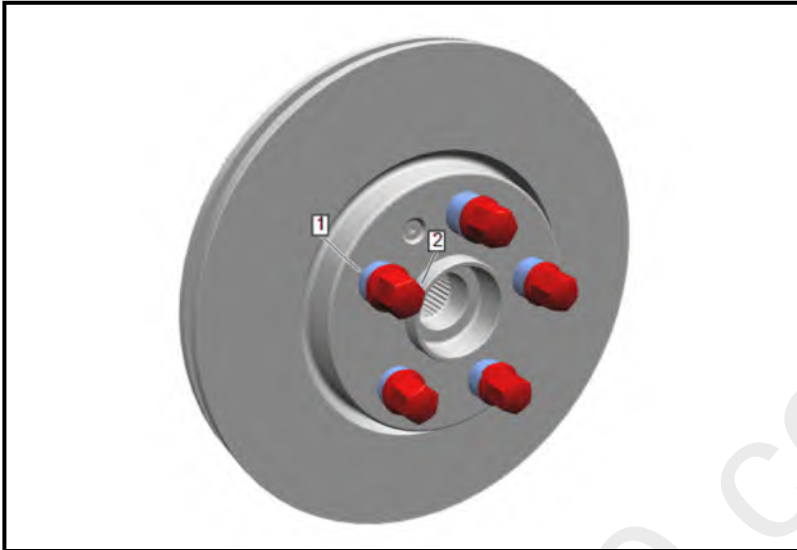
WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. [Brake Rotor Thickness Variation Measurement](#)
- Brake rotor assembled LRO exceeding the maximum allowable specification can cause thickness variation to develop in the brake

rotor over time, usually between 4, 800 - 11, 300 km (3, 000 - 7, 000 mi). [Brake Rotor Assembled Lateral Runout Measurement](#)

2. Inspect the mating surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
3. Index the brake rotor in a different orientation to the hub/axle flange.
4. Hold the rotor firmly in place against the hub/axle flange and install one of the **CH-45101-100** Conical Brake Rotor Washers (1) and one lug nut (2) onto the upper-most wheel stud.
5. Continue to hold the rotor secure and tighten the lug nut firmly by hand.
6. Install the remaining **CH-45101-100** Conical Brake Rotor Washers and lug nuts onto the wheel studs and tighten the nuts firmly by hand in a star-pattern.



7. Tighten the lug nuts in a star-pattern to specification, in order to properly secure the rotor. [Tire and Wheel Removal and Installation](#)
8. Measure the assembled LRO of the brake rotor. [Brake Rotor Assembled Lateral Runout Measurement](#)
9. Compare the amount of change between this measurement and the original measurement.
10. If this measurement is within specifications, proceed to step 14.
11. If this measurement still exceeds specifications, repeat steps 1 - 9 until the best assembled LRO measurement is obtained.
12. Matchmark the final location of the rotor to the wheel studs if the orientation is different than it was originally.
13. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to [Brake Rotor Assembled Lateral Runout Correction](#).
14. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts.

BRAKE ROTOR ASSEMBLED LATERAL RUNOUT CORRECTION - ON VEHICLE LATHE

NOTE: This procedure is not used in Europe.

Special Tools

CH-45101-100 Conical Brake Rotor Washers

For equivalent regional tools, refer to [Special Tools](#).

WARNING: Refer to [Brake Dust Warning](#) .

NOTE:

- Brake rotor thickness variation **MUST** be checked **BEFORE** checking for assembled lateral runout (LRO). Thickness variation exceeding the maximum acceptable level can cause brake pulsation. [Brake Rotor Thickness Variation Measurement](#)
- Brake rotor assembled LRO exceeding the maximum allowable specification can cause thickness variation to develop in the brake rotor over time, usually between 4 800 - 11 300 km (3, 000 - 7, 000 mi). [Brake Rotor Assembled Lateral Runout Measurement](#)
- This procedure cannot be used on vehicles with ETRS (Electronic Transmission Range Select).

1. Ensure that the caliper and caliper bracket that are already being supported, are clear from contacting any rotating components, such as the brake rotor.
2. Remove the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts that were installed during the assembled LRO measurement procedure and/or the indexing correction procedure.
3. Inspect the mounting surface of the hub/axle flange and the brake rotor to ensure that there are no foreign particles or debris remaining.
4. Set up the lathe, following the manufacturer's instructions.
5. Refinish the brake rotor, following the brake lathe manufacturer's instructions.
6. After each successive cut, inspect the brake rotor thickness. [Brake Rotor Thickness Measurement](#)
7. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced. After replacing the rotor, proceed to step 10.
8. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
 1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
 2. Using moderate pressure, apply the non-directional finish:
 - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120-grit aluminum oxide sandpaper.
 - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150-grit aluminum oxide sandpaper.
 3. After applying a non-directional finish, clean each friction surface of the brake rotor with denatured alcohol, or an equivalent approved brake cleaner.
9. Remove the lathe from the vehicle.
10. Measure the assembled LRO of the brake rotor. [Brake Rotor Assembled Lateral Runout Measurement](#)
11. If the brake rotor assembled LRO measurement still exceeds the maximum allowable specification, refer to [Brake Rotor Assembled Lateral Runout Correction](#).
12. If the brake rotor assembled LRO is within specification, install the brake caliper and depress the brake pedal several times to secure the rotor in place before removing the **CH-45101-100** Conical Brake Rotor Washers and the lug nuts.

BRAKE ROTOR REFINISHING**Special Tools**

- **CH-41013** Rotor Resurfacing Kit
- **CH-42450-A** Wheel Hub Resurfacing Kit

Equivalent regional tools: [Special Tools](#)

WARNING: [Brake Dust Warning](#) .

The disc brake rotors do not require refinishing as part of routine brake system service. New disc brake rotors do not require refinishing.

Do not refinish disc brake rotors in an attempt to correct the following conditions:

- Brake system noise - squeal, growl, groan
- Uneven and/or premature disc brake pad wear
- Superficial or cosmetic corrosion/rust of the disc brake rotor friction surface
- Scoring of the disc brake rotor friction surface less than the maximum allowable specification

Before refinishing a brake rotor, the rotor **MUST** first be checked for adequate thickness to allow the rotor to be refinished and remain above the minimum allowable thickness after refinish specification. **Brake Rotor Thickness Measurement**

Disc brake rotors should only be refinished if they have adequate thickness to be refinished. A rotor can be refinished if one or more of the following conditions exists (DO NOT refinish for cosmetic reasons):

- Thickness variation and/or lateral runout are in excess of the maximum allowable specification
- Excessive corrosion/rust and/or pitting on the braking surface
- Excessive blueing discoloration and/or heat spots on the braking surface
- Scoring of the disc brake rotor surface in excess of the maximum allowable specification

Disc brake rotors may need to be refinished as part of the process for correcting brake rotor assembled lateral runout (LRO) that exceeds the maximum allowable specification.

If the vehicle is equipped with cross-drilled rotors, use a lathe with positive rake tooling. This setup requires less cutting pressure, which will result in less vibration, and a better surface finish. Also, use a vibration dampener when cutting. Otherwise, refinish according to the following instructions.

NOTE: **Whenever the brake rotor has been separated from the hub/axle flange, clean any rust or contaminants from the hub/axle flange and the brake rotor mating surfaces. Failure to do this may result in increased assembled lateral runout (LRO) of the brake rotor, which could lead to brake pulsation.**

1. Using the **CH-42450-A** Wheel Hub Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface of the hub/axle flange.
2. Using the **CH-41013** Rotor Resurfacing Kit, thoroughly clean any rust or corrosion from the mating surface and mounting surface of the brake rotor.
3. Inspect the mating surfaces of the hub/axle flange and the rotor to ensure that there are no foreign particles or debris remaining.
4. Mount the brake rotor to the brake lathe according to the lathe manufacturer's instructions, ensuring that all mounting attachments and adapters are clean and free of debris.
5. Ensure that any vibration dampening attachments are securely in place.
6. With the brake lathe running, slowly bring in the cutting tools until they just contact the brake rotor friction surfaces.
7. Observe the witness mark on the brake rotor. If the witness mark extends approximately three-quarters or more of the way around the brake rotor friction surface on each side, the brake rotor is properly mounted to the lathe.
8. If the witness mark does not extend three-quarters or more of the way around the brake rotor, re-mount the rotor to the lathe.
9. Following the brake lathe manufacturer's instructions, refinish the brake rotor.
10. After each successive cut, inspect the brake rotor thickness. **Brake Rotor Thickness Measurement**

11. If at any time the brake rotor exceeds the minimum allowable thickness after refinish specification, the brake rotor must be replaced.
12. After refinishing the brake rotor, use the following procedure in order to obtain the desired non-directional finish:
 1. Follow the brake lathe manufacturer's recommended speed setting for applying a non-directional finish.
 2. Using moderate pressure, apply the non-directional finish:
 - If the lathe is equipped with a non-directional finishing tool, apply the finish with 120-grit aluminum oxide sandpaper.
 - If the lathe is not equipped with a non-directional finishing tool, apply the finish with a sanding block and 150-grit aluminum oxide sandpaper.
 3. After applying a non-directional finish, clean each friction surface of the brake rotor with a solution of mild dish washing detergent and water, or a GM approved brake cleaner and a clean shop towel to remove metal particles remaining from machining. Repeat the cleaning process if necessary to remove all metal particles.
13. Remove the brake rotor from the brake lathe.
14. Measure the assembled LRO of the brake rotor to ensure optimum performance of the disc brakes. **Brake Rotor Assembled Lateral Runout Measurement**
15. If the brake rotor assembled LRO measurement exceeds the specification, bring the LRO to within specifications. **Brake Rotor Assembled Lateral Runout Correction**

DESCRIPTION AND OPERATION

DISC BRAKE SYSTEM DESCRIPTION AND OPERATION

System Component Description

The disc brake system consists of the following components:

Disc Brake Pads

Applies mechanical output force from the hydraulic brake calipers to friction surfaces of brake rotors.

Disc Brake Rotors

Uses mechanical output force applied to friction surfaces from the disc brake pads to slow speed of tire and wheel assembly rotation.

Disc Brake Pad Hardware

Secures disc brake pads firmly in proper relationship to the hydraulic brake calipers. Enables a sliding motion of brake pads when mechanical output force is applied.

Disc Brake Caliper Hardware (Floating Caliper)

Provides mounting for hydraulic brake caliper and secures the caliper firmly in proper relationship to caliper bracket. Enables a sliding motion of the brake caliper to the brake pads when mechanical output force is applied.

System Operation (Floating Caliper)

Mechanical output force is applied from the hydraulic brake caliper pistons to the inner brake pads. As the pistons press the inner brake pads outward, the caliper housings draw the outer brake pads inward. This allows the output force to be equally distributed. The brake pads apply the output force to the friction surfaces on both sides of the brake rotors, which slows the rotation of the tire and wheel assemblies. The correct function of both the brake pad and brake caliper hardware is essential for even distribution of braking force.

System Operation (Fixed Caliper)

Mechanical output force is applied from the hydraulic brake caliper inboard and outboard pistons to the inner and outer brake pads. The brake calipers are a fixed, opposed-piston design, allowing the output force to be equally distributed through the distribution of the pressurized brake fluid within the caliper. The brake pads apply the output force to the friction surfaces on both sides of the brake rotors, which slows the rotation of the tire and wheel assemblies. The correct function of the brake pad hardware and of the brake caliper inboard and outboard pistons is essential for even distribution of braking force.

System Characteristics

Brake Noise

Brake noise can occur and to a degree, some brake noise is normal. Variations in driving conditions such as the weather, environment, driving patterns, differences in vehicle loading, and type or style of driving, can affect brake wear. Any one of these variations can cause brake noise to become apparent. Inspect and verify that all metal-to-metal contact areas of the brake pads, brake pad guides or springs, brake caliper housing, caliper bracket and/or suspension knuckle, as applicable, are clean and free of corrosion and scale.

Brake noise is a "slip-stick" vibration of disc brake components and, if it occurs intermittently, can be considered normal. Most brake noise may be eliminated or temporarily reduced by performing 3 or 4 aggressive brake applications. If the brake noise persists or consistently recurs, application of a damping compound to the brake pad mounting plate where it contacts the caliper can lessen the vibration as the components move relative to each other. Refer to Adhesives, Fluids, Lubricants, and Sealers in this section for recommended compounds.

The following brake noises are characteristic of all brake systems. These noises cannot be avoided, and may not indicate improper operation of the brake system.

Squeak/Squeal Noise

A squeak or squeal noise can occur on vehicles with front semi-metallic brake pads during light to medium brake pedal application at low to moderate vehicle speeds. Occasionally this noise may appear from the front or rear brakes after a period of non-use such as overnight, or cold brakes and/or in high humidity conditions.

Grinding Noise

Common occurrence for rear brakes and some front disc brakes during initial brake applications after the vehicle has been parked overnight. Caused by light corrosion forming on the metal brake component friction surfaces during vehicle non-use. Typically disappears after the first few brake applications.

Groan Noise

A groan type noise may be heard during a quick stop, or when slowly moving forward from a complete stop. On vehicles equipped with antilock brake systems (ABS), a groan or moan noise may occur during heavy brake application or on road surfaces with compromised traction such as loose gravel, or on wet or icy roads. This is a normal function of ABS activation.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

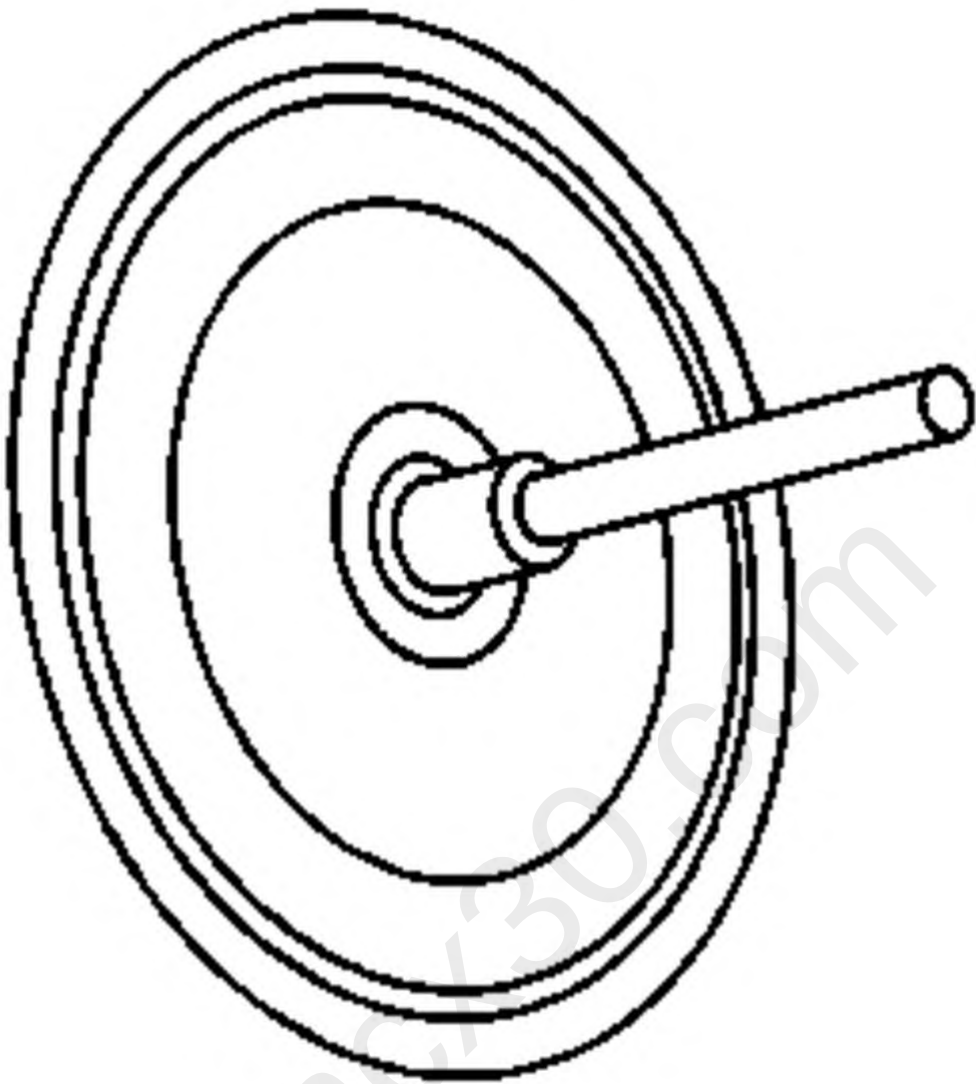
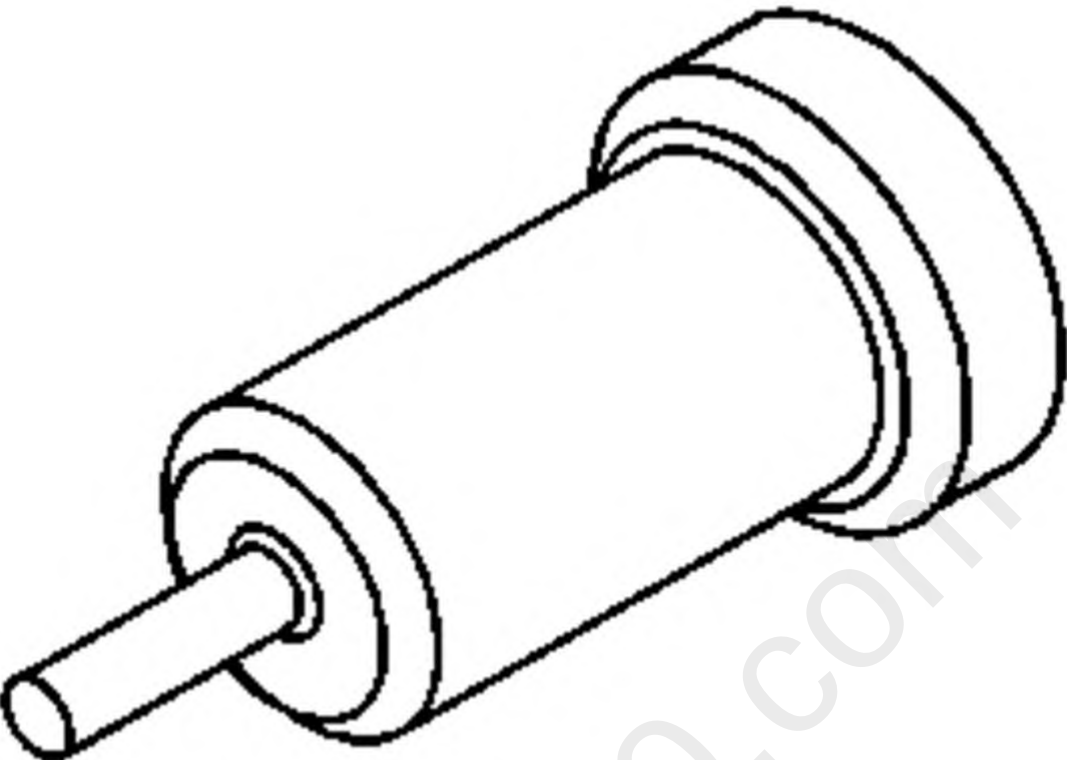
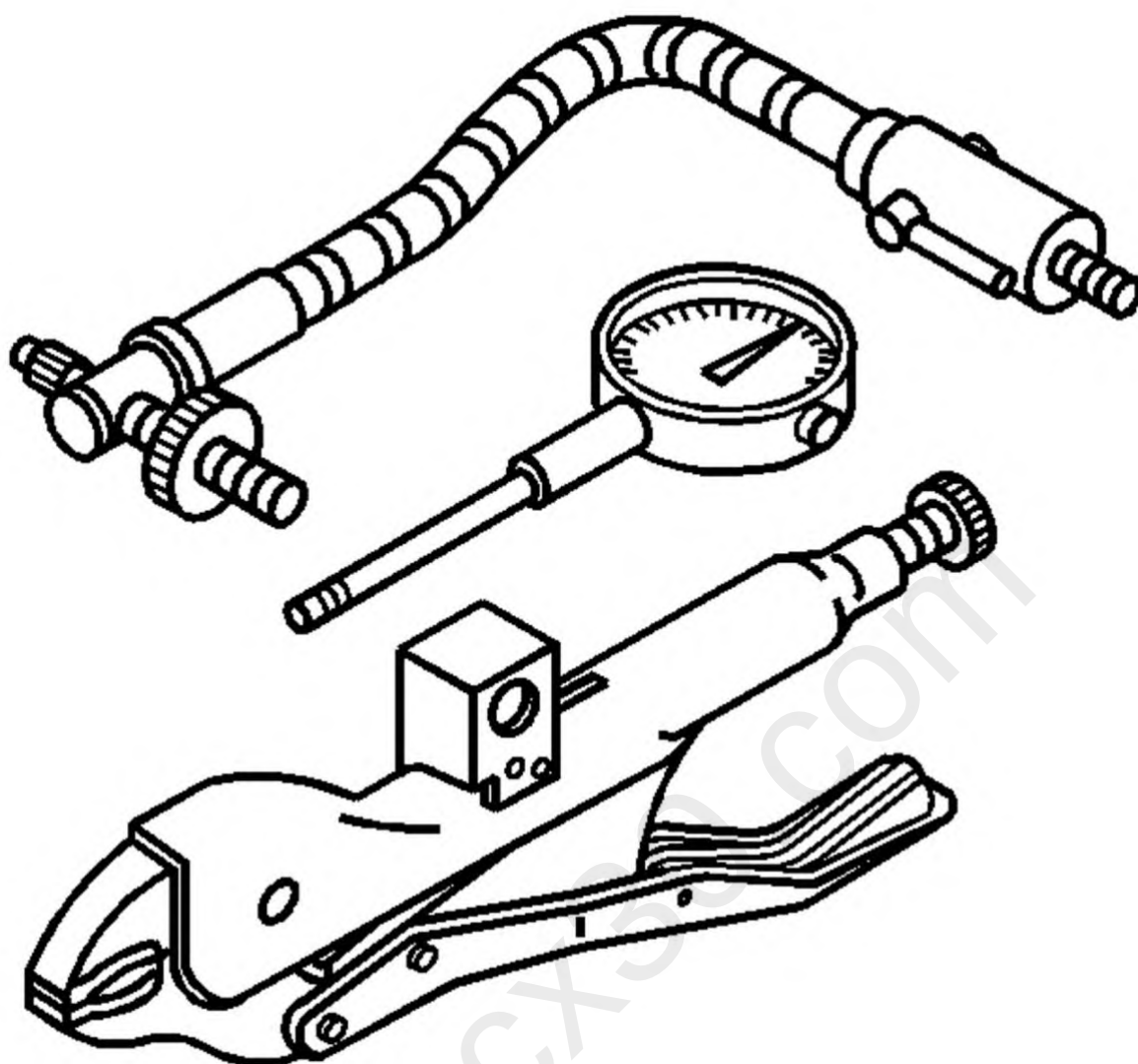
Illustration	Tool Number/ Description
 A line drawing of a rotor, which is a circular component with a central shaft. The rotor has a central hub with a circular opening. A shaft passes through the center of the rotor, and a nut is threaded onto the shaft, securing the rotor in place. The rotor is shown from a side-on perspective, highlighting its circular shape and the central shaft.	CH 41013 J 41013 Rotor Resurfacing Kit

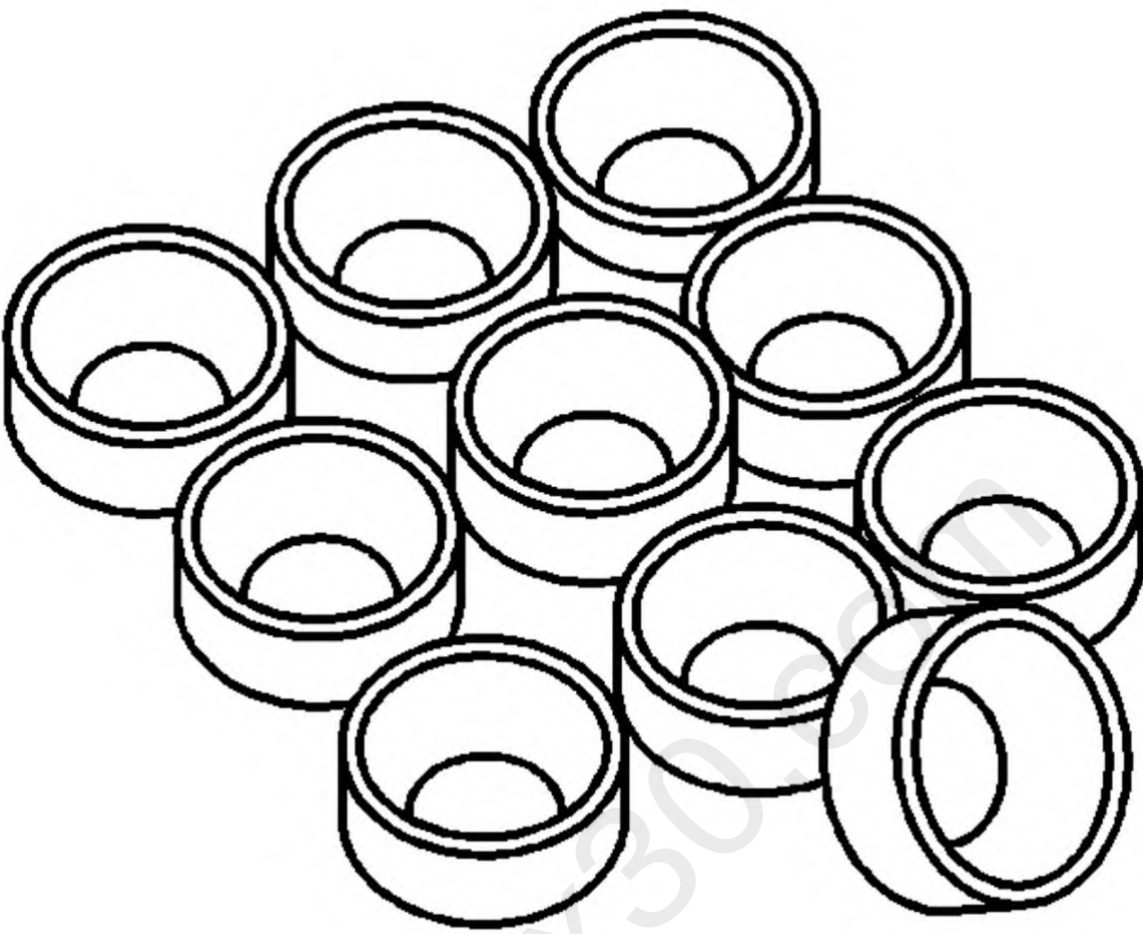
Illustration	Tool Number/ Description
 A technical line drawing of a cylindrical tool, likely a wheel hub resurfacing kit. It features a central shaft with a flange at each end. The shaft is shown in perspective, extending from the bottom left towards the top right. The flanges are circular and have a slightly raised, beveled edge. The drawing is simple, using black lines on a white background.	CH 42450-A J 42450-A Wheel Hub Resurfacing Kit

Illustration

Tool
Number/
Description



CH 45101
J 45101
Hub and
Wheel
Runout
Gauge

Illustration	Tool Number/ Description
 A line drawing of 12 conical brake rotor washers. The washers are arranged in a cluster, with some overlapping. Each washer has a conical shape with a flat top and a slightly flared bottom. The drawing is a simple line art representation.	CH 45101- 100 J 45101- 100 Conical Brake Rotor Washers