MAXXUS™ 2.0
MAXXUS™ L 2.0

REPAIR AND MAINTENANCE INSTRUCTIONS

MM19040

WABCO
Mobilizing Vehicle Intelligence

Edition 1

Version 3 (10.2020)

MM19040 (en)

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1 General Information

1.1 Symbols Used in this Document

⚠ DANGER

Description of an immediate situation which will result in irreversible injurty or death if the warning is ignored.

⚠ WARNING

Description of a possible situation which may result in irreversible injury or death if the warning is ignored.

⚠ CAUTION

Description of a possible situation which may result in irreversible injury if the warning is ignored.

NOTICE

Description of a possible situation which may result in material damage if the warning is ignored.

Important information, notices and/or tips

Reference to information on the Internet

Descriptive text

– Action step

1. Action step 1 (in ascending order)
2. Action step 2 (in ascending order)

   ⇨ Result of an action

• Listing

Indicating the use of a tool / WABCO tool

1.2 How to Obtain Additional Maintenance, Service and Product

If you have any questions about the material covered in this publication, orfor more information about the WABCO product line, please contact WABCO Customer Care Center at 855-228-3203, by email at wnacustomercare@wabco-auto.com, or visit our website: www.wabco-na.com.

Refer to the Society of Automotive Engineers (SAE) website to find all current SAE documents and standards applicable to WABCO products (such as SAE J447 and SAE J908 at www.sae.org).

Refer to the National Highway Traffic Safety Administration (NHTSA) website to find all current documents referenced in the manual at www.nhtsa.gov.

1.3 WABCO TOOLBOX PLUS™ Software

The TOOLBOX PLUS™ Software provides PC diagnostic for WABCO products and can be purchased and downloaded from https://wabco.snapon.com.

The software User Guide, MM19047 can be obtained by visiting www.wabco-na.com/literature

1.4 WABCO Academy

www.wabco-academy.com

1.5 WABCO Online Product Catalog

www.wabco-customercenter.com/

1.6 Your Direct Contact to WABCO

WABCO North America LLC

WABCO USA LLC

1220 Pacific Drive
Auburn Hills, MI 48326

Customer Care Center: (855) 228-3203

www.wabco-na.com

2 Safety Information

2.1 Prerequisites and Protective Measures

- Follow all warning notes, notices and instructions in this document to avoid personal injury and material damage.
- Follow the company's accident prevention regulations as well as regional and national regulations.
- Follow the instructions of the axle and vehicle manufacturer.
- Follow the instructions of the brake chamber manufacturer.
- Use personal protective equipment if required (safety shoes, protective goggles, respiratory protection, ear protectors, etc.).
- Only trained and qualified automotive technicians are to perform work on the vehicle.
- The workplace has to be dry, as well as sufficiently lit and ventilated.
- Before working on the brakes, secure the vehicle with wheel chocks against rolling away.
- Before working on the brake, use the mechanical release devices ("caging bolts") on spring chambers.
- A second person must assist during removal and installation of the brake.

2.2 Intended Activities

- Use suitable equipment, such as a vice, to clamp the brake when performing repairs on the brake outside the vehicle.
- Check the brake pad thickness at regular intervals, in relation to vehicle use, during maintenance intervals, as well as in the context of applicable local laws and regulations.
- Only grasp the brake caliper on the outside.
- Only use spare parts approved by WABCO or the vehicle manufacturer.
- Only use grease contained in the repair kits.
- Only use brake chambers as specified by the axle or vehicle manufacturer.
- Only carry out repairs with the recommended tools and tightening torques.

2.3 Improper Activities

- Do not use compressed air or other high-pressure devices when cleaning the brake or the vehicle. Hazardous dusts arising may lead to injuries. Rubber parts of the brake could also be damaged.
- Do not use motor-driven screwdrivers or torque tools.
- Never open the caliper with the clamping unit.
- Never loosen the screws inside the caliper cover, otherwise the warranty will be voided. The screws are glued and the brake would be destroyed by opening.

3 Inspection Cycle

A visual inspection of the brakes through the wheel is recommended during every tire pressure check.

This table provides a guide to maintenance interval planning. However, depending on the particular vehicle's application (e.g., corrosive environment, heavy usage on rough or gravel roads, etc.) more frequent inspections of the braking system components may be necessary.

Inspection Cycle			
Kind of Inspection	**Every 6 Months** (4 months severe duty**)	**Every 12 Months**	**Every Pad Exchange**
	Wheel On	**Wheel OFF**	
Inspect the pad thickness by visual inspection or measure caliper position with a ruler.	X	X	
Inspect the rotors for cracks through to vent channels, etc.	X	X	X
Check boots, seals and end caps for rips, tears, damages, or cracks.		X	X
Measure pad wear, and inspect all retaining hardware for damage (pad retainer bar, pad springs, and mounting holes)		X	X
Check running clearances and adjuster operation.		X	X
Check caliper slide movement (should move easily in and out by hand) and check caliper guiding pin bearing play.			X
Inspect all caps, hoses, and brake exterior for damage, etc.			X
Ensure brake pad retainer bar is torqued to specification.			X

Refer to WABCO warranty documentation for severe versus standard duty definition: https://www.wabco-na.com/

4 Important Information

4.1 Target group of the document

This document is intended for trained and qualified personnel.

4.2 Validity of the document

This document applies to the following WABCO part numbers:

640 421 003 0

640 421 004 0

640 421 005 0

640 421 006 0

640 421 007 0

640 421 008 0

640 421 009 0

640 421 010 0

This document lists all the components of a MAXXUS 2.0 and MAXXUS L 2.0 disc brake and the corresponding action steps, so that all MAXXUS 2.0 and MAXXUS L 2.0 variants can be maintained and repaired using this document.

5 Description of the Disc Brake

5.1 Introduction

The MAXXUS 2.0 resp. MAXXUS L 2.0 disc brake is a pneumatic one-piston-brake, which is intended for use in commercial vehicles on front and rear axles for 22.5" wheel rims as service, auxiliary and parking brake.

The MAXXUS 2.0 resp. MAXXUS L 2.0 disc brake is mechanically actuated via a diaphragm or spring chamber cylinder. The brake chamber is directly fastened on the brake caliper (1).

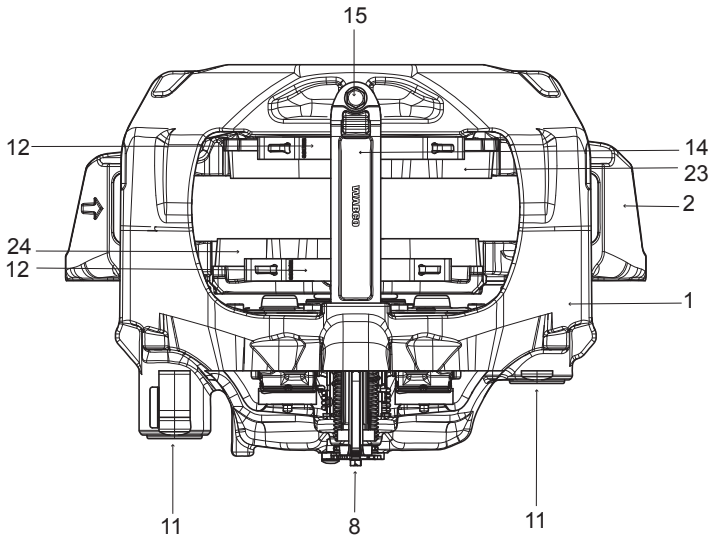
The complete MAXXUS 2.0 resp. MAXXUS L 2.0 disc brake, including the brake chamber, consists of two assemblies: brake caliper (1) and brake carrier (2).

1	Caliper
2	Brake carrier
A	Brake caliper shifting direction

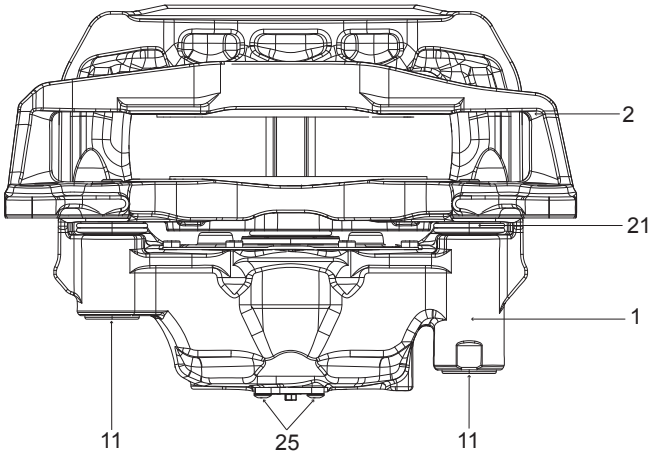
Description of the Disc Brake

5.2 Disc Brake Views

Top View and Sectional View (left brake)



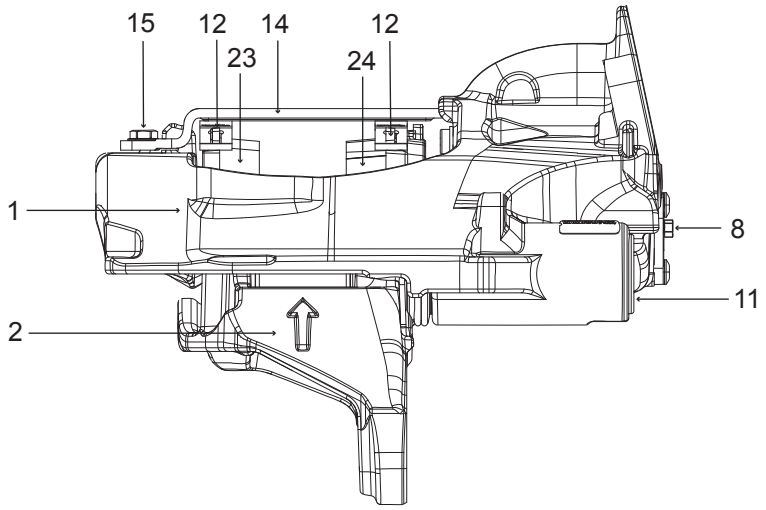
View From Below (left brake)



1	Pre-assembled brake caliper with clamping unit	**15**	Hexagon screw
2	Brake carrier	**21**	Boot (guiding bolt), 2x
8	Return unit hexagon	**23**	Brake pad outboard with pre-assembled leaf spring
11	Sealing cover	**24**	Brake pad inboard with pre-assembled leaf spring
12	Leaf springs	**25**	Torx® screw, 2x
14	Bracket		

Description of the Disc Brake

Side View (left brake)



1	Pre-assembled brake caliper with clamping unit	**12**	Leaf springs
2	Brake carrier	**14**	Bracket
8	Return unit hexagon	**23**	Brake pad outboard with pre-assembled leaf spring
11	Sealing cover	**24**	Brake pad inboard with pre-assembled leaf spring

5.3 Functional Description

The brake caliper (1) moves axially on guiding bolts (3, 4) of the brake carrier (2). The brake pads (23, 24) are guided and supported axially movable in the brake carrier (2). The brake pad support (23, 24) is implemented by means of a bracket (14) and leaf springs (12).

For compensating the lining wear the actuating mechanism of the brake is equipped with a force-dependent, stageless, automatic adjuster mechanism. This mechanism maintains a preset clearance regardless of load and operating conditions. This, together with the stable and robust construction of the caliper (1), results in safe control of the pedal travel and increases the reserve of travel for emergency braking.

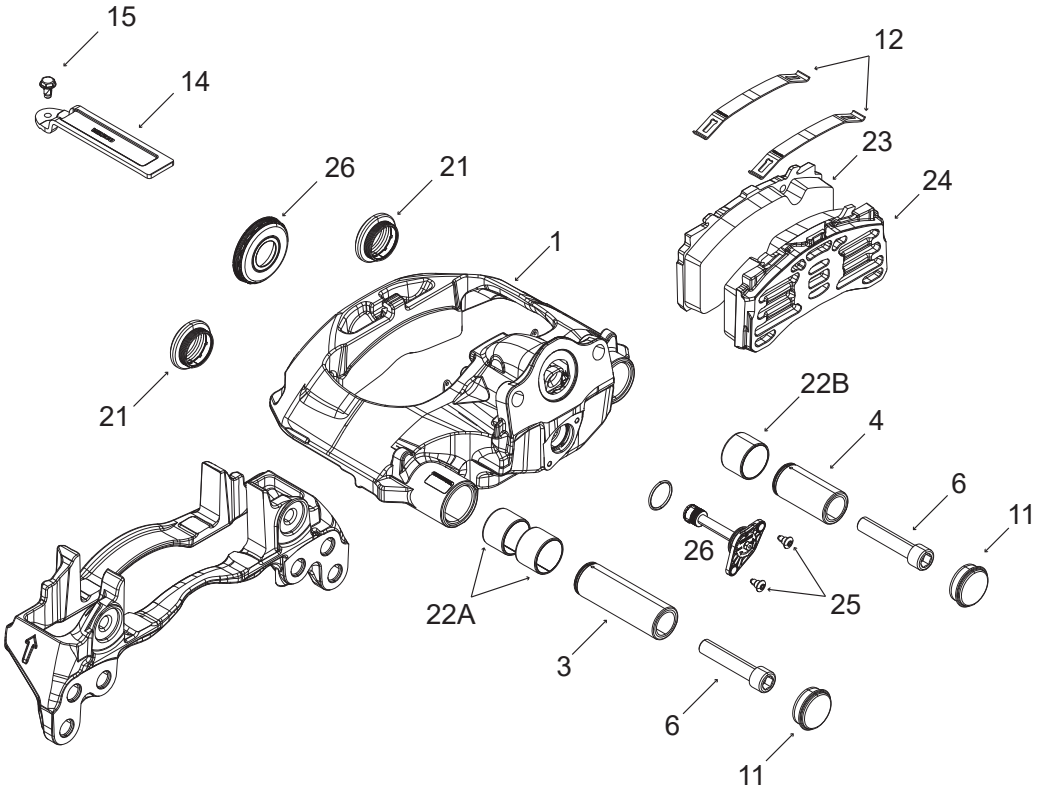
All rubber parts and the grease fillings are designed to be maintenance-free except when damaged.

If there is an indicator in the vehicle, it lights up when the residual lining thickness is reached, as not every brake has its own wear indicator. Worn brake pads (23, 24) must be replaced in a workshop.

5.4 Exploded View of the Replacement Parts

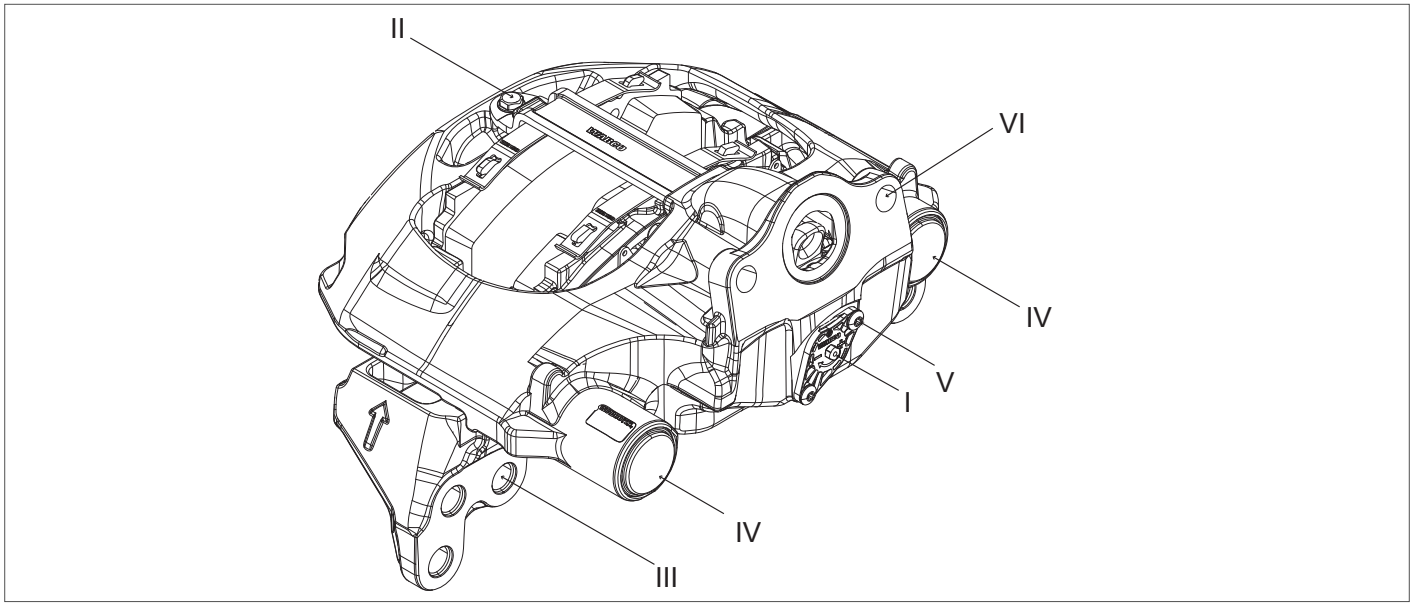
WABCO repair kits and service documentation
https://www.wabco-na.com/

Illustration of Replacement Parts (example of a left brake)



1	Pre-assembled brake caliper with clamping unit	**15**	Hexagon screw
3	Guiding bolt, long (fitting bolts)	**21**	Boot (guiding bolt), 2x
4	Guiding bolt, short (clearance bolt)	**22**	**22A** Bushings of the long guiding bolt, 2x **22B** Bushings of the short guiding bolt, 1x
6	Socket-head cap screw, 2x	**23**	Brake pad outboard with pre-assembled leaf spring
8	Return unit hexagon	**24**	Brake pad inboard with pre-assembled leaf spring
11	Sealing cover	**25**	Torx® screw, 2x
12	Leaf springs	**26**	Return unit
14	Bracket		

6 Tools, Widths Across Flats (AF) and Tightening Torques



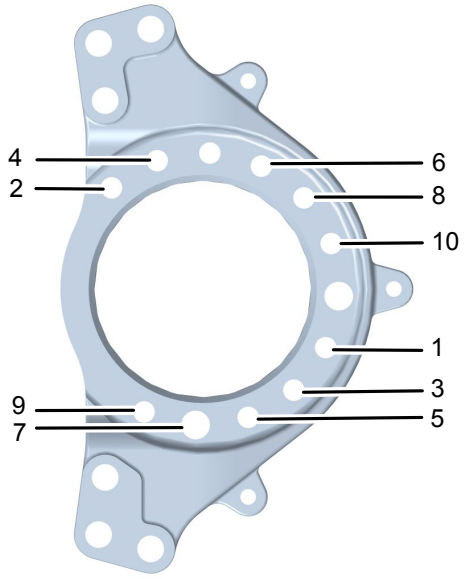
Item	Tools With Application	Width Across Flats (AF)		Tightening Torque Remarks
		External	Internal	
I	Ring wrench for the hexagon on the shaft of the return unit	8	–	Direction of rotation on the hexagon: Return clockwise (right), max. 11 ft·lb (15 Nm), air gap becomes larger Adjust counterclockwise (left) max. 4 ft·lb (5 Nm), air gap becomes smaller
II	Socket wrench for hexagon screw of the bracket	13	–	15 ft·lb +4 ft·lb (20 +5 Nm)
III	Socket wrench for bolting the brake to the axle adapter	30	–	See chapter "7 Recommended torque and sequence", page 17. Follow the instructions of the axle or vehicle manufacturer.
IV	Socket wrench for the socket-head cap screws of the guiding bolt screw connection	–	14	96 ft·lb (130 Nm) +90° (angle controlled tightening) Tightening sequence for guiding bolts: 1. Guiding bolt long => fitted bolt (with socket-head cap screw) 2. Guiding bolt short => clearance bolt (with socket-head cap screw)
V	Torx® screw driver for Torx® screws of the return unit	–	T30	5 ft·lb +1.5 ft·lb (7 Nm +2 Nm)

Tools, Widths Across Flats (AF) and Tightening Torques

Item	Tools With Application	Width Across Flats (AF)		Tightening Torque Remarks
		External	Internal	
VI	Socket wrench for bolting the brake chamber to the caliper	24	–	133 - 155 ft·lb (180 - 210 Nm) (applies to original WABCO cylinders) • Screw on the fastening nuts by hand until the brake chamber makes full contact. • Tighten the fastening nuts with approx. 89 ft·lb (120 Nm). • Tighten the fastening nuts with 133 - 155 ft·lb (180 - 210 Nm). Use fastening nuts only once.

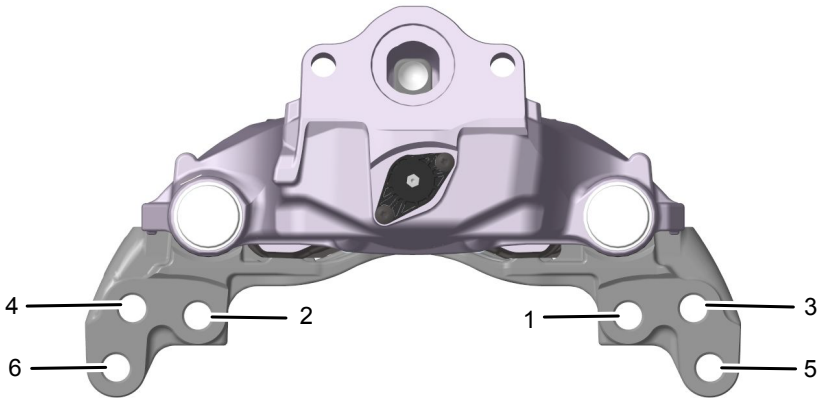
7 Recommended Torque and Sequence

1. Insert and hand tighten all fasteners.
2. Pre-torque to 100 ft·lb +/- 10 ft·lb (135 Nm +/- 13.5 Nm) following sequence shown in the picture.
3. Final torque to 289 ft·lb +/- 11 ft·lb (319 Nm +/- 14.9 Nm) following sequence shown in the picture.



1. Insert and hand tighten all fasteners.
2. Pre-torque to 50 ft·lb +/- 10 ft·lb (74.5 Nm +/- 13.5 Nm) following sequence shown in the picture.
3. Final torque to 369 ft·lb +/- 11 ft·lb (500 Nm +/- 14.9 Nm) following sequence shown in the picture.

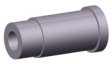
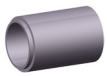
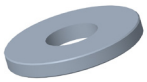
If use of WABCO tool Q see chapter "8 WABCO Tools", page 18 is necessary for your application refer to instructions included with tool Q for proper usage to identify the correct torque value as needed.



8 WABCO Tools

You need the following WABCO original tools for repairing the MAXXUS 2.0 and MAXXUS L 2.0 disc brake.

WABCO original tools can be obtain by contacting WABCO Customer Care Center at (855)228-3203 or by visiting www.wabco-cutomercenter.com.

Tool Set 300 100 014 2			
Item	**Tool Name**	**Item**	**Tool Name**
A 	Threaded spindle TR 20x4 300 100 030 4	I 	Press-in sleeve fitting bolt, top 300 100 034 4
B 	Thrust bearing 810 710 007 4	J 	Press-in sleeve fitting bolt, bottom 300 100 035 4
C 	Nut TR 20x4 891 500 057 4	K 	Drive-in sleeve, cover 300 100 025 4
D 	Shim 300 100 003 4	L 	Press-fit cup 300 100 023 4
E 	Round washer 810 409 017 4	M 	Holding rod 300 100 022 4
F 	Press-out sleeve 300 100 032 4	N 	Connecting bolt 300 100 007 2
G 	Press-out bolt 893 040 013 4	O 	Press-in tool 300 100 036 4
H 	Press-in sleeve clearance bolt 300 100 033 4		

Tool 300 100 026 4		Tool 895 820 009 2	
Item	Tool Name	Item	Tool Name
P 	Return unit tool set	Q 	30 mm Adapter Wrench

9 Checking the Brake

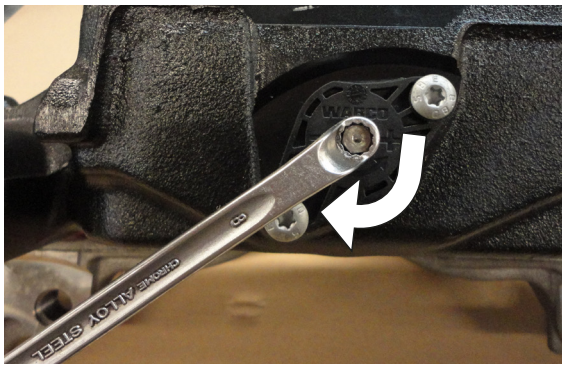
9.1 Checking the Return

- The brake chamber must not be dismantled to check the return. The brake is shown without the brake chamber for illustration purposes only.
- To check the return, the brake pads (23, 24) with the retainer system, consisting of leaf springs (12), bracket (14) and hexagon screw (15), must be installed.

For this chapter you require the following tools:

- Ring wrench, AF 8 (external) see page 15 (item I) or WABCO tool P see page 18
- Screwdriver

1. Check the hexagon of the return unit (8) for wear and damage.



NOTICE

Damage to the hexagon screw of the return unit (8) due to the use of open-ended wrenches and motor-driven torque tools

The use of open-ended wrenches and motor-driven torque tools can result in damage to the return unit (8) hexagon screw.

– Only use the tools recommended by WABCO.

2. Turn the hexagon of the return unit (8) ½ to ¾ turns clockwise using the ring wrench, AF 8 (external) or using the WABCO tool P.

Checking the return is only possible with a larger air gap 0.08 to 0.12 inch (2 to 3 mm).

Checking the Brake

The mechanism runs smoother during adjustment than during return. In both cases, a clutch engages in the end position to prevent damage to the adjustment mechanism. This clutch actuation can be noticed by a clacking noise.

3. Adjust the air gap to 0.08 to 0.12 inch (2 to 3 mm).
   ⇨ There must be sufficient space for the attached tool (ring wrench, AF 8 (external) or the WABCO tool P). It must not be obstructed when it is turned during return. The tool is used for optical assistance only so that the rotation of the hexagon of the return unit (8) is discerned more clearly.
4. Leave the ring wrench, AF 8 (external) or the WABCO tool P on the hexagon of the return unit (8).
5. Gently apply the brake 5 times.

Pay attention to the ring wrench, AF 8 (external) or the WABCO tool P.

Actions	Result
Turns counter-clockwise incrementally.	Correct function
Angle of rotation becomes smaller with each actuation.	Correct function
Does not turn.	Incorrect function; replace brake see chapter "12 Replacing the Brake", page 41
Turns during the first actuation only.	Incorrect function; replace brake see chapter "12 Replacing the Brake", page 41
Turns back-and-forth during each actuation.	Incorrect function; replace brake see chapter "12 Replacing the Brake", page 41

6. Remove the ring wrench, AF 8 (external) or the WABCO tool P from the hexagon of the return unit (8).
7. Reset the air gap to 0.04 inch (0.9 mm) having completed the return test see chapter "10.6 Adjusting the Air Gap", page 37.

9.2 Checking the Brake Pads

- Check the brake pad thickness at regular intervals, in relation to vehicle use, during maintenance intervals, as well as in the context of applicable local laws and regulations.
- The following tests can be carried out with the brake installed.

9.2.1 Checking the Brake Pads Visually

– Immediately replace burnt, vitrified or oiled brake pads (23, 24) see chapter "10 Replacing the Brake Pads", page 28.

9.2.2 Checking the Brake Pad Wear with the Brake Installed (Method 1)

- Checking the lining wear with the brake installed is only possible with disc brakes that are equipped with a respective edge on the caliper (1).
- The vehicle wheels do not have to be removed.

– Check the position of edge (A) on the brake caliper (1) across from the position of surface (B) on the solid brake carrier flange.

Brake pads (23, 24) new and unworn

If edge (A) of the caliper (1) is not covered by surface (B) of the brake carrier (2), the brake pads (23, 24) are not yet worn.

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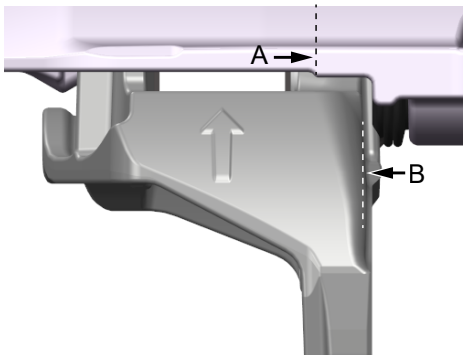

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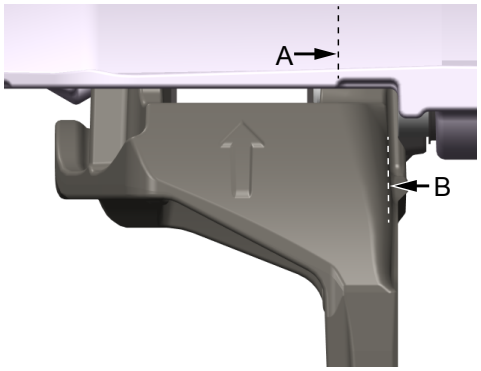

Brake pads (23, 24) worn

If edge (A) is covered by the edge of the surface (B), the brake pads (23, 24) are worn.

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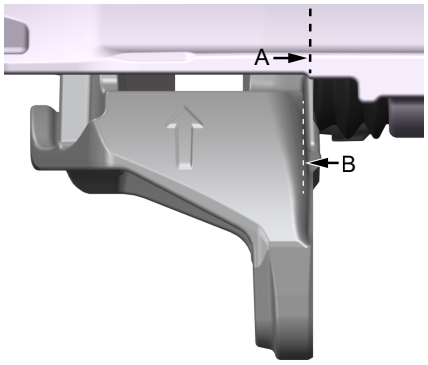
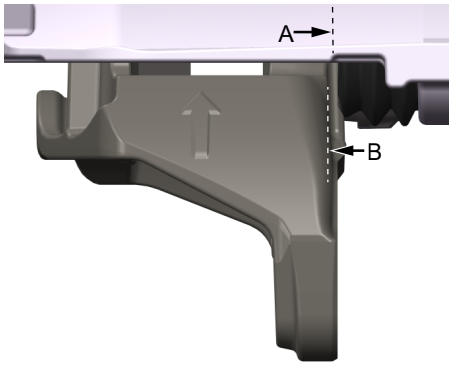


MAXXUS 2.0



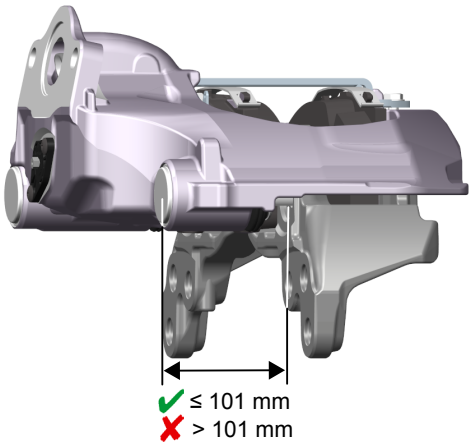
9.2.3 Measuring the Brake Pad Wear (Method 2)

For this chapter you require the following tools:

- Tape measure

The mean lining wear can be measured using a tape measure - depending on accessibility - either on the long guiding bolt (fitting bolt) (3) or the short guiding bolt (clearance bolt) (4).

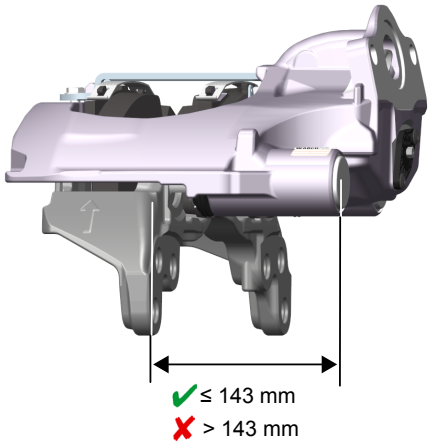
1. For a measurement on the side of the clearance bolt (4), place the tape measure on the surface on the brake carrier (2) next to the short guiding bolt (clearance bolt) (4).



Measure the distance from the surface on the brake carrier (2) (A) to the surface of the sealing cover (11).

⇨ The wear limit has been reached when the measured distance on the short guiding bolt (clearance bolt) (4) exceeds 4 inch (101 mm).

2. For a measurement on the side of the fitting bolt (3), place the tape measure on the surface on the brake carrier (2) next to the long guiding bolt (fitting bolt) (3).



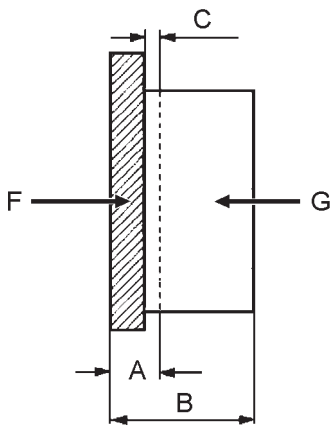
Measure the distance from the surface on the brake carrier (2) (A) to the surface of the sealing cover (11).

⇨ The wear limit has been reached when the measured distance on the long guiding bolt (fitting bolt) (3) exceeds 5.6 inch (143 mm).

The measuring point on the brake carrier (2) is the surface, where the brake carrier (2) is bolted to the axle.

3. If the wear limits has been reached or exceeded, replace the brake pads (23, 24) see chapter "10 Replacing the Brake Pads", page 28.
4. Check the brake disc (rotor) see chapter "9.3 Checking the Brake Discs (rotor)", page 24.

9.2.4 Measuring the Thickness of the Brake Pads



1. Measure the overall thickness of the lining carrier (F) and brake pad (G).

A	Total thickness of worn brake pad with lining carrier (limit value, inboard: 0.9 inch (23 mm); limit value, outboard: 0.4 inch (11 mm))
B	Total thickness of new brake pad (inboard: 1.7 inch (42 mm); outboard: 1.2 inch (30 mm))
C	Lining thickness, worn without lining carrier (limit value 2 mm residual lining thickness)
F	Lining carrier
G	Brake pad

2. To avoid damage to the brake disc (rotor), replace the brake pads (23, 24) latest when the brake pads (23, 24) reach the wear limit at their thinnest spot. Refer to section 3 - Inspection Cycle and section 9.2 - Checking the Brake Pads for recommended inspection timing and procedures.

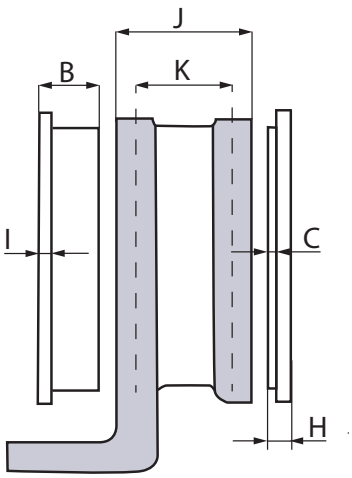
> The residual lining thickness must not become less than 0.08 inch (2 mm) above the lining carrier. If the pads wear beyond this point, serious damage to the rotor can occur.

3. Replace the brake pads (23, 24), if the wear limit (inboard A < 0.9 inch (23 mm), outboard A < 0.4 inch (11 mm) has been reached or exceeded see chapter "10 Replacing the Brake Pads", page 28.

9.3 Checking the Brake Discs (rotor)

- Check the brake discs (rotor) at regular intervals, in relation to vehicle use, during maintenance intervals, as well as in the context of applicable local laws and regulations.
- The following tests can be carried out with the brake installed.

1. Remove the brake pads (23, 24) see chapter "10.2 Removing the Brake Pads", page 31.
2. Measure the brake disc (rotor) thickness at the contact area of the brake pads (23, 24).



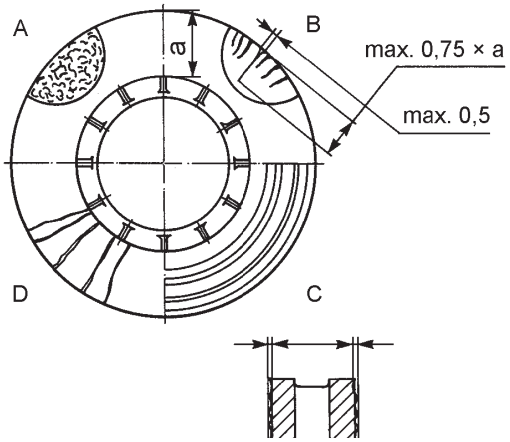
B	Total thickness of new brake pad: Lining, inboard = 1.7 inch (42 mm); lining, outboard = 1.2 inch (30 mm)
C	Minimum thickness of brake pad: 2 mm
H	Absolute minimum thickness, brake pad and brake lining carrier plate: Lining, inboard = 0.9 inch (23 mm); lining, outboard = 0.4 inch (11 mm) The brake pads must be replaced.
I	Brake lining carrier plate: Lining, inboard = 0.8 inch (21 mm); lining, outboard = 0.4 inch (9 mm)
J	Total thickness of the new brake disc (rotor): 1.8 inch (45 mm)
K	Wear allowance limit: 1.5 inch (37 mm) The brake disc (rotor) must be replaced.

3. Replace the brake disc (rotor) if the wear limit of 1.5 inch (37 mm) has been reached at the thinnest point.

- Only fit cleaned and grease-free brake discs (rotor).
- Always replace all brake discs (rotor) by axle.

Checking the Brake

9.3.1 Checking the Brake Discs (rotor) Visually

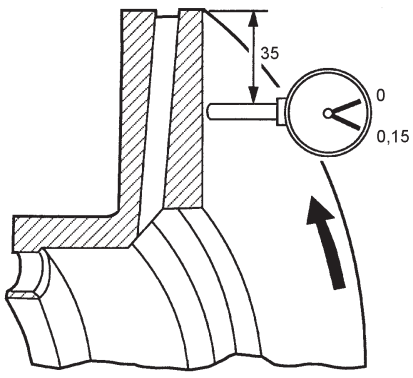


A	Web-like crack formation: permissible
B	Radial cracks up to max. 0.02 inch (0.5 mm) width: permissible
C	Unevenness of the disc surfaces up to max. 0.06 inch (1.5 mm) deep: permissible
D	Continuous cracks: not permissible
a	Width of the braking area

1. Check the brake disc (rotor) for cracks and the condition of the surface.
2. Replace the brake disc (rotor) if the brake disc (rotor) has continuous cracks or unevenness or when cracks exceed the max. dimensions.

9.3.2 Checking the Brake Disc (rotor) Runout

1. Fasten the dial indicator to the brake carrier (2).

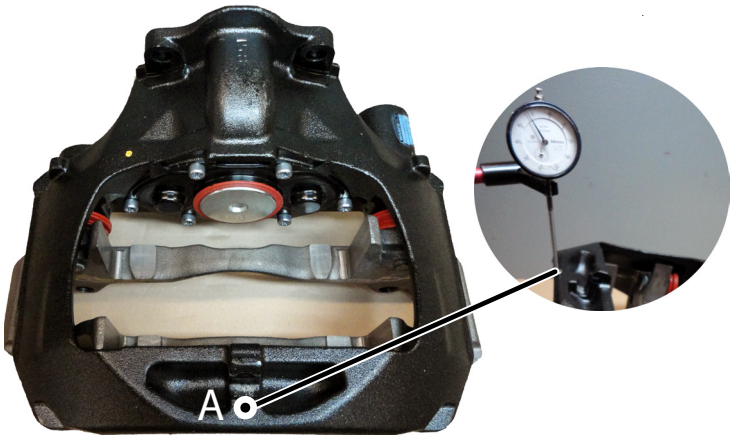


2. With the brake disc (rotor) installed, check the disc (rotor) runout by rotating the wheel hub. Limit value: 0.006 inch (0.15 mm).
3. Replace the brake disc (rotor) if the brake disc (rotor) runout is more than 0.006 inch (0.15 mm).
4. Install the brake pads see chapter "10.5 Installing the Brake Pads", page 36.
5. Adjust the air gap see chapter "10.6 Adjusting the Air Gap", page 37.

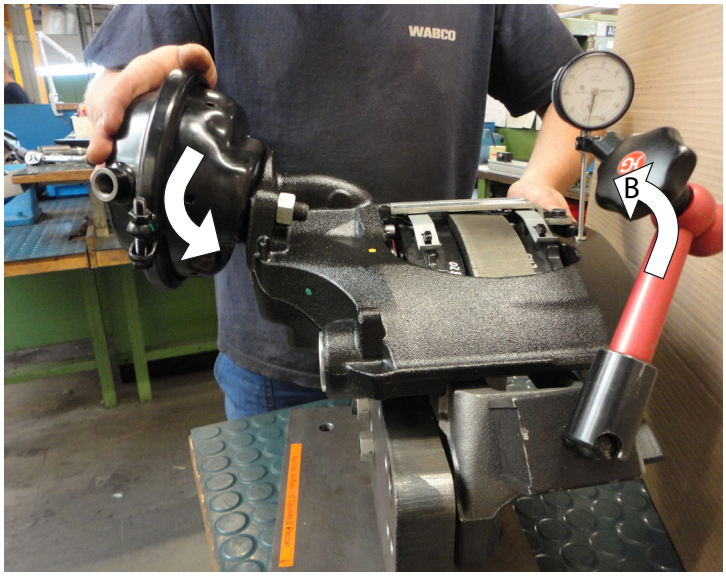
9.4 Checking the Bearing Clearance of the Guiding Bolts

1. Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.
2. Remove the brake pads (23, 24)see chapter "10.2 Removing the Brake Pads", page 31.
3. Push the caliper (1) completely to the outboard by hand.
4. Fasten the magnetic dial indicator support to the brake carrier (2) or the axle.
5. Clean the measuring point.

The measuring point is the molded edge on the caliper (1) on the outboard.

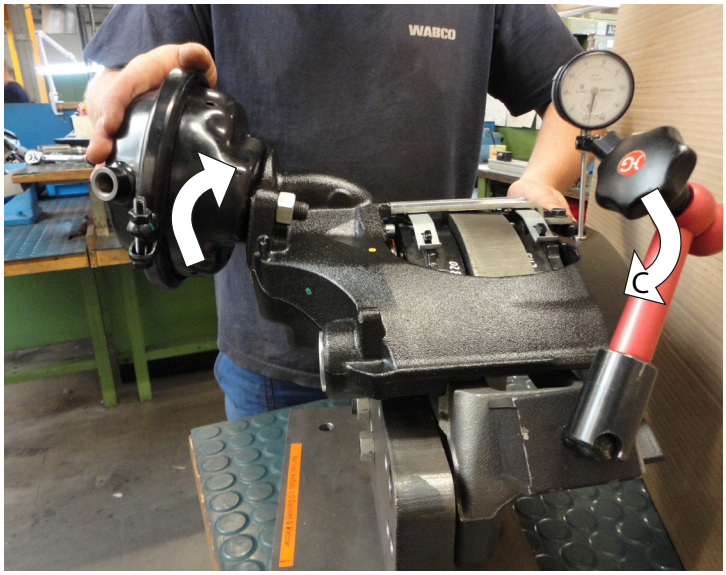


6. Press the dial indicator against the measuring point (A) on the brake caliper (1).



7. Tilt the brake caliper (1) as far as possible (arrow B) applying a slight force.
8. Set the dial indicator to zero.

Checking the Brake



9. Now, tilt the brake caliper (1) as far as possible applying a slight force into the opposite direction (arrow C).
10. Read the dial indicator
11. The bearing clearance must not be greater than 0.08 inch (2 mm).
12. Replace the bushings of the guiding bolts (22A and 22B) if the measured bearing clearance is greater than 0.08 inch (2 mm) see chapter "14.1 Replacing the Sealing Covers and Bushings of the Guiding Bolts", page 46.
13. Remove the measuring device (dial indicator including magnetic support).
14. Install the brake pads (23, 24) see chapter "10.5 Installing the Brake Pads", page 36.
15. Adjust the air gap see chapter "10.6 Adjusting the Air Gap", page 37.
16. Proceed with see chapter "15 Final Activities", page 61.

10 Replacing the Brake Pads

10.1 Returning

For this chapter you require the following tools:

- Socket wrench, AF 13 (external) see page 15 (item II)
- Ring wrench, AF 8 (external) see page 15 (item I) or WABCO tool P see page 18
- Screwdriver

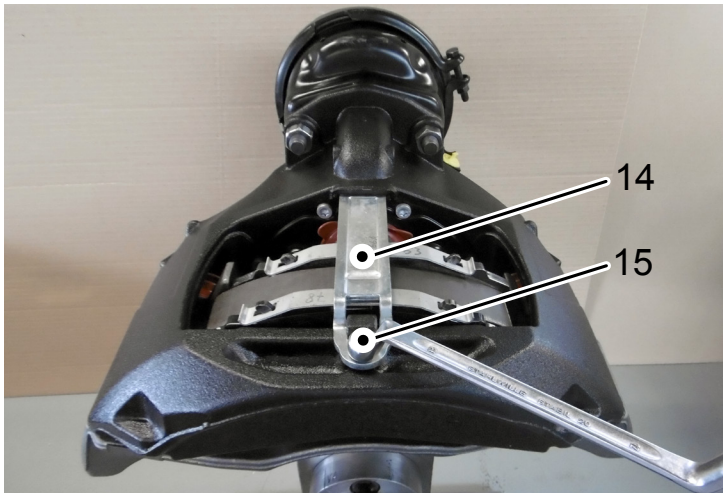
1. Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer. Please check with them before starting these actions.

⚠ CAUTION

Risk of injury for fingers and hands

Holding the brake on the inside may lead to finger and hand injuries.

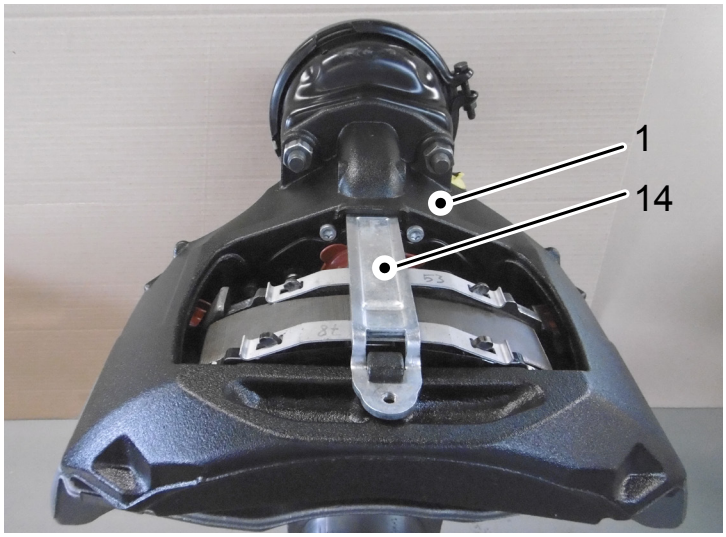
– Always hold the brake at the outer edges.



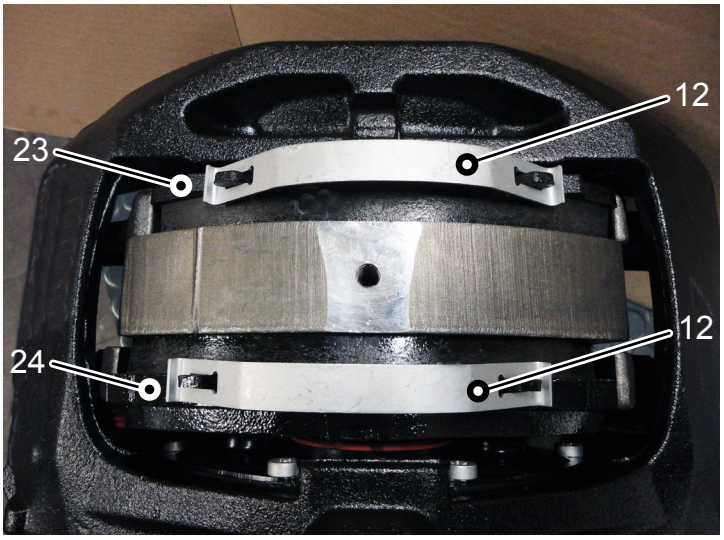
2. Loosen the hexagon screw (15) of the bracket (14) using the ***socket wrench, AF 13 (external)***.

Apply pressure on the bracket (14) with your hand at the same time.

Replacing the Brake Pads



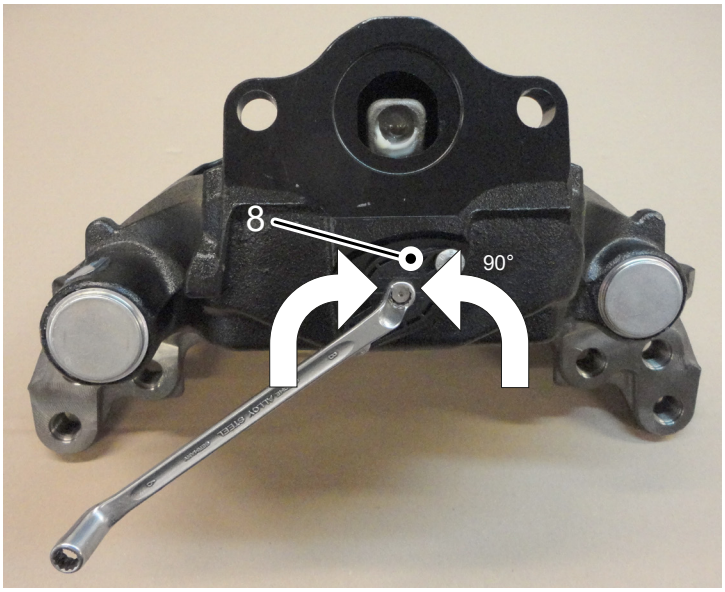
3. Pull the bracket (14) out of the brake caliper (1).



The leaf springs (12) are mounted captively on the brake pads (23, 24).

4. Check the return unit (8) for wear and damage.
5. Replace the return unit (8), if you detect wear or damage see chapter "13 Replacing the Return Unit", page 44.

Replacing the Brake Pads



6. Turn the hexagon of the return unit (8) clockwise up to the stop using the ring wrench, AF 8 or using the WABCO tool P.

When turning further, a cracking of the overload clutch can be heard.

7. Then turn the hexagon of the return unit (8) counterclockwise by approx. 90°.

10.2 Removing the Brake Pads

⚠ CAUTION

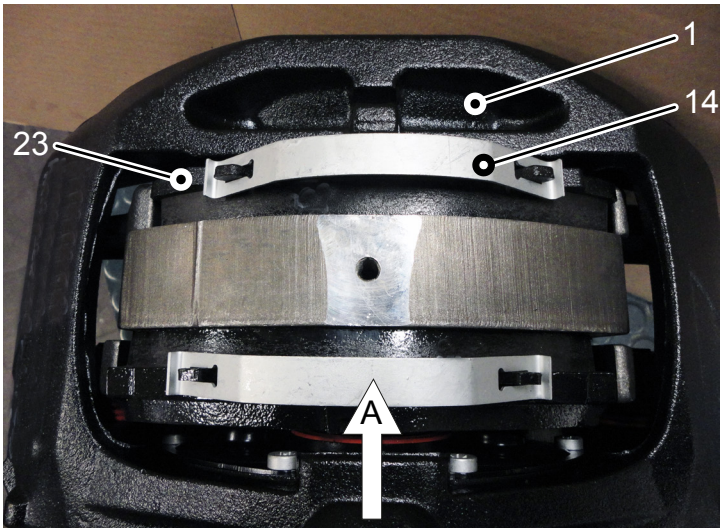
Risk of injury due to brake actuation with brake pads removed

Actuating the brake with the brake pads removed while carrying out repairs on the brake may lead to injuries.

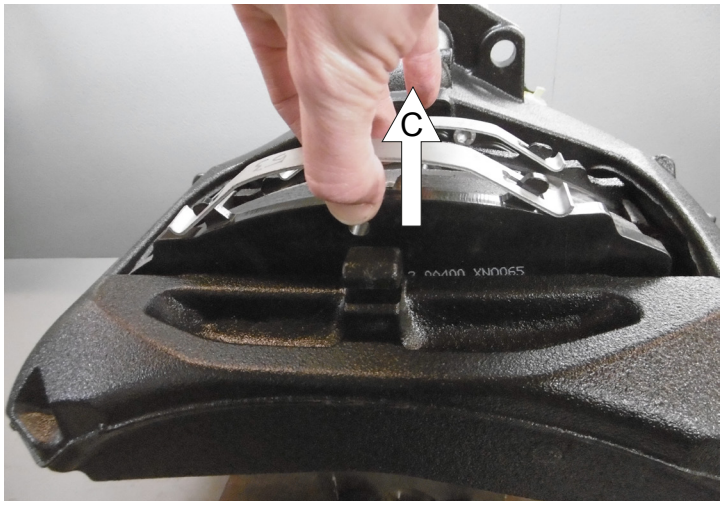
– Fasten a note to the steering wheel indicating that repair work is being performed and that the brake must not be actuated.

1. Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer. Please check with them before starting these actions.

- The brake chamber does not need to be dismantled in order to replace the brake pads (23, 24).
- Always replace the brake pads (23, 24) by axle and use a new retainer system, consisting of bracket (14), hexagon screw (15) and leaf springs (12). Leaf springs (12) are already pre-assembled on the brake pads (23, 24).

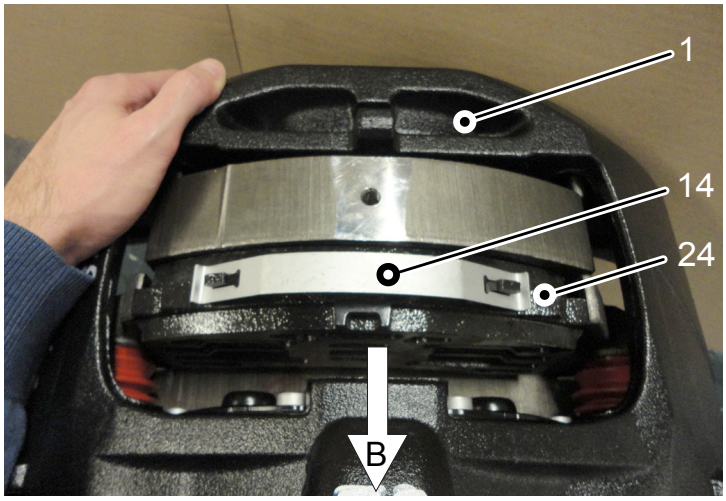


2. Push the caliper (1) towards the outboard by hand (arrow A).

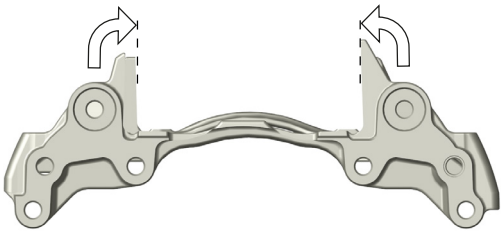


3. Remove the brake pad (23) upwards (arrow C) on the outboard with leaf spring (12).

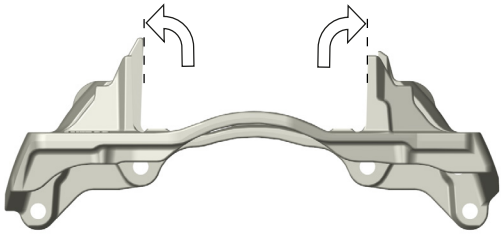
Replacing the Brake Pads



4. Remove the brake pad (24) on the inboard (B).

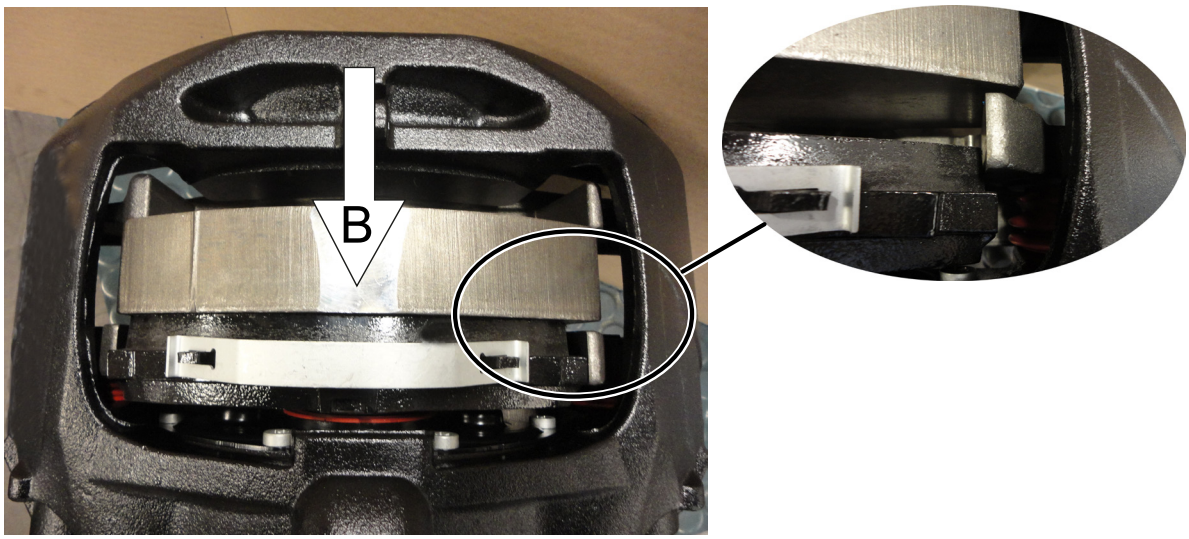


Lining contact surfaces, inboard

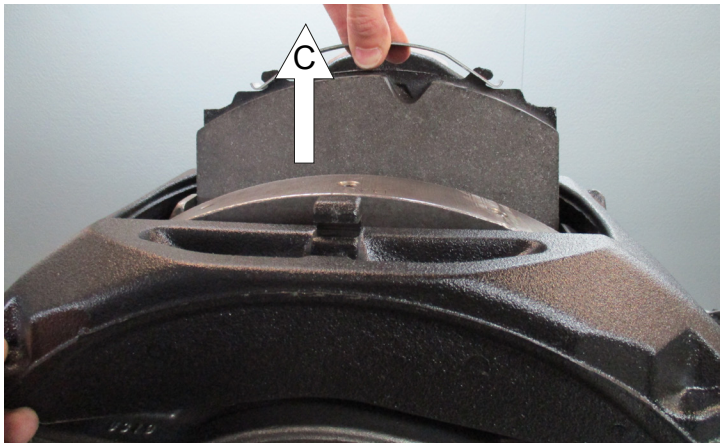


Lining contact surfaces, outboard

As the brake carrier has angled lining contact surfaces (see previous figures), tilted outwards on the outboard and inwards on the inboard, it is not possible to install the lining of the outboard on the inboard and vice versa.



5. Push the brake caliper (1) by hand towards the inboard (arrow B) by hand until the brake pad can be removed upwards (arrow C) from the brake carrier (1).



6. Remove the brake pad (24) on the inboard.

⚠ WARNING

Risk of accident due to damaged brake

Improper cleaning (e.g., using a wire brush) can damage the boots (guiding bolt) and the piston protection cap.

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail.**

– Properly clean the boots (guiding bolt) and the piston protection cap.

7. Clean the lining slots and lining guide on the brake caliper (1) using a wire brush and remove corrosion from these components.
8. Make sure that the guide surfaces of the lining slots on the brake carrier (2) are clean and free of grease.

10.3 Checking the Brake Caliper Movement

For this chapter you require the following tools:

- Ring wrench with AF 8 (external) see page 15 (item I) or WABCO tool P see page 18

⚠ WARNING

Risk of accident due to damaged brake

When moving the caliper, there is a risk that the boots (guiding bolt) are crushed against the brake carrier.

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail**.

– Ensure that the boots (guiding bolt) are not crushed against the brake carrier.

Replacing the Brake Pads

9. Manually move the caliper (1) on the guiding bolts (3, 4) across the entire displacement path and check for ease of movement (G).
10. Replace the bushings (22), guiding bolts (3, 4), socket-head cap screws (6) and sealing covers (11) if the caliper (1) moves sluggishly see chapter "14.1 Replacing the Sealing Covers and Bushings of the Guiding Bolts", page 46.
11. Push the brake caliper (1) towards the inboard.

10.4 Checking the Seals

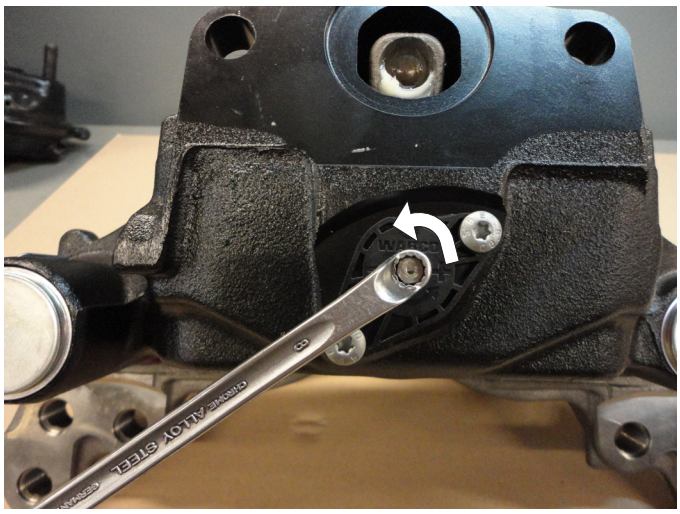
For this chapter you require the following tools:

- Ring wrench with AF 8 (external) see page 15 (item I) or WABCO tool P see page 18

1. Check the boots (guiding bolt) (21) for wear and damage.
2. Replace any defective boots (guiding bolt) (21) see chapter "14.2 Replacing the Boots (guiding bolt)", page 50.

Replacing the Brake Pads

If the adjusting screw has already been unscrewed due to worn brake linings, the piston protection cap can be checked directly without having to unscrew the adjusting screw any further.



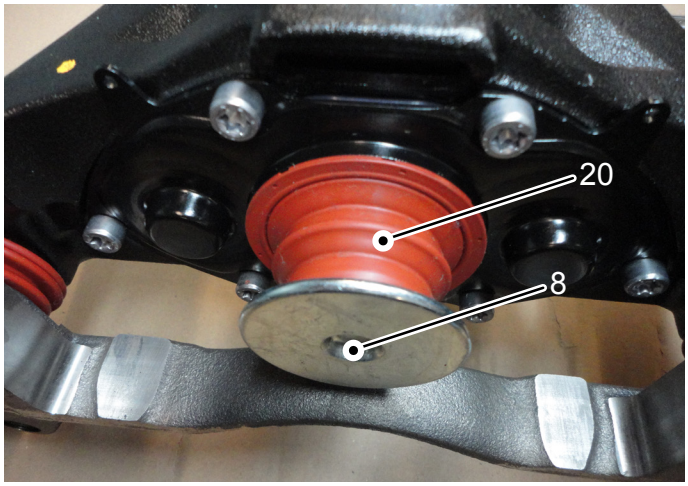
NOTICE

Damage to the hexagon of the return unit

The use of open-ended wrenches and motor-driven torque tools can result in damage to the return unit hexagon screw.

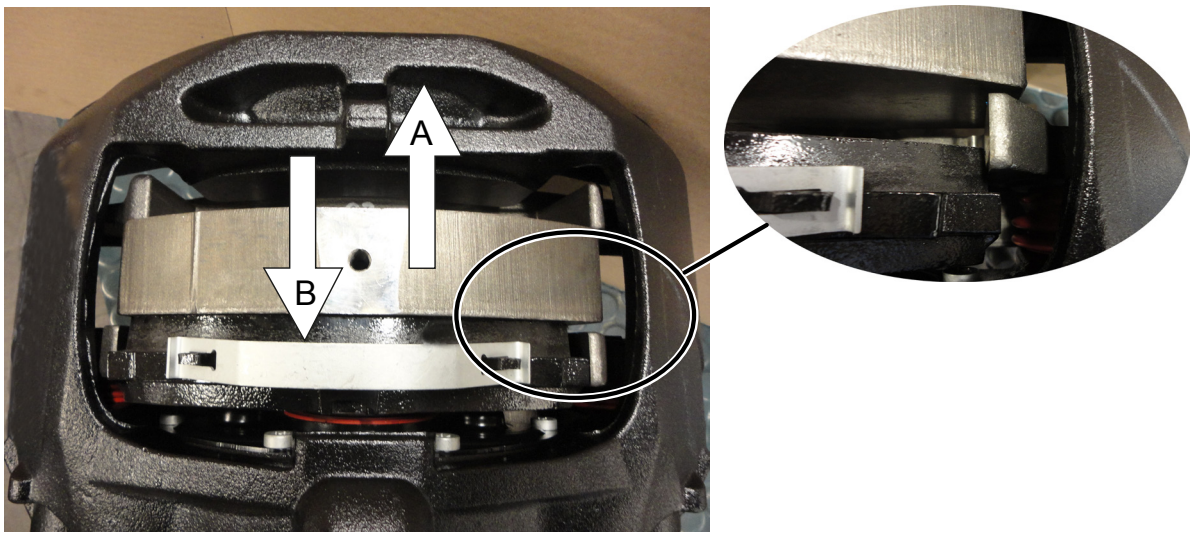
– Only use a ring wrench, AF 8 (external) or the WABCO tool P.

3. Turn the hexagon of the return unit (8) counterclockwise using the ring wrench, AF 8 (external) or using the WABCO tool P, until the adjusting screw is unscrewed approx. 30 mm.

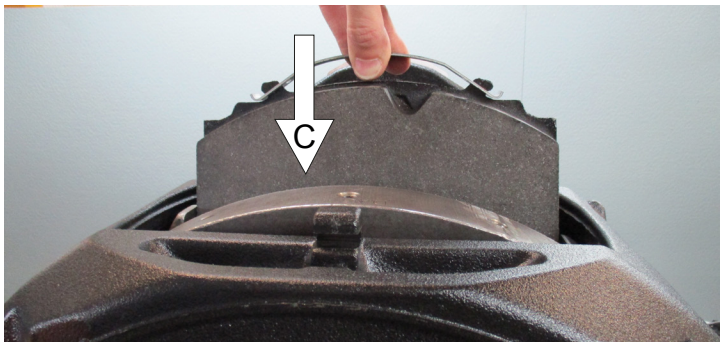


4. Check the piston protection cap (20) for wear and damage.
5. If the piston protection cap (20) is damaged, check whether dirt or moisture has penetrated into the brake's interior parts or have damaged the caliper (1) due to corrosion.
6. Replace the brake if you have identified damage or corrosion see chapter "12 Replacing the Brake", page 41.
7. Replace the piston protection cap (20) if it was damaged during service work on the brake see chapter "14.3 Replacing the Piston Protection Cap", page 56.

10.5 Installing the Brake Pads



1. Push the brake caliper (1) towards the inboard by hand (B).



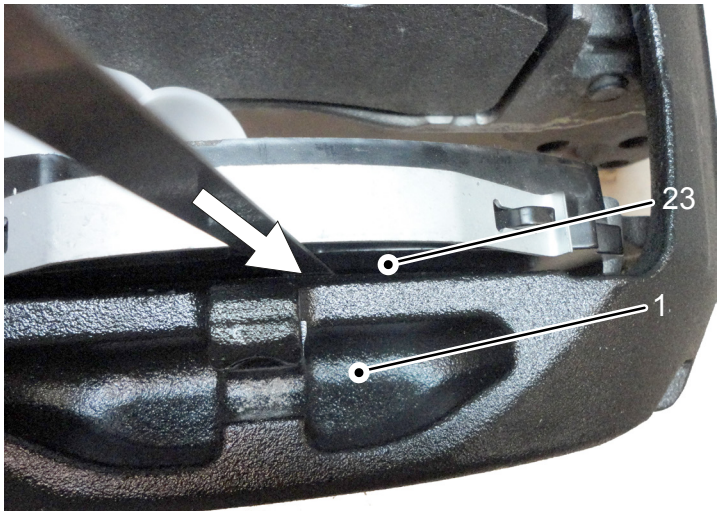
2. Push the brake pad of the inboard (24) between piston (20) and brake carrier (2) downwards (C), until the brake pad (24) can be moved easily towards the outboard (A).
3. Fit a new brake pad (24) on the inboard.
4. Push the brake caliper (1) towards the outboard until the brake pad of the inboard (24) rests against the brake disc (rotor).
5. Fit a **new** brake pad (23) on the outboard.
6. Push the brake caliper (1) towards the outboard (A) until the brake pad (23) rests against the brake disc (rotor).
7. Fit a new brake pad (24) with a new pre-assembled leaf spring (12) on the outboard.

> Mount the bracket (14) only after you adjusted the air gap.

10.6 Adjusting the Air Gap

For this chapter you require the following tools:

- Ring wrench, AF 8 (external) see page 15 (item I) or WABCO tool P see page 18
- Socket wrench, AF 13 (external) see page 15 (item II)
- Feeler gauge



8. Insert a 0.04 inch (0.9 mm) thick feeler gauge (see white arrow) centered between the back side of the brake pad of the outboard (23) and the brake caliper (1).

NOTICE

Damage to the hexagon of the return unit

The use of open-ended wrenches and motor-driven torque tools can result in damage to the return unit hexagon screw.

– Only use a ring wrench, AF 8 (external) or the WABCO tool P.

9. Turn the hexagon of the return unit (8) counterclockwise using the ring wrench, AF 8 (external) or using the WABCO tool P, until both brake pads (23, 24) rest against the brake disc (rotor).
10. Remove the feeler gauge.
11. Insert the new bracket (14) into the openings of the caliper (1).
12. Press the bracket (14) against the caliper (1) by hand.
13. Fasten a new hexagon screw (14) on brake caliper (1) using the socket wrench, AF 13 (external). Tightening torque: 15 ft·lb +4 ft·lb (20 +5 Nm)
14. Check whether the wheel hub rotates freely.
15. Proceed with see chapter "15 Final Activities", page 61.

11 Replacing the Brake Chamber

The dust plug must be mounted again during the maintenance cycles.

11.1 Removing the Brake Chamber

For this chapter you require the following tools:

- Socket wrench, AF 24 (external) see page 15 (item VI)

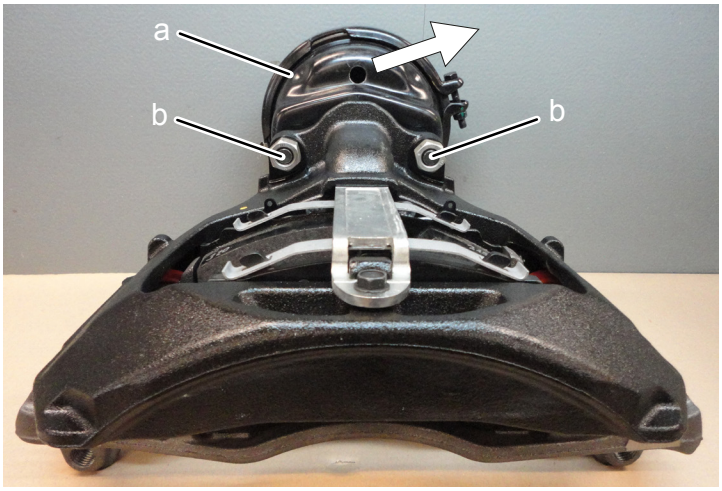
1. Disconnect the air supply to the vehicle before carrying out this work.
2. Make sure that the connecting lines are disconnected before you remove the diaphragm cylinder.

⚠ WARNING

Risk of accident due to damaged brake

Dirt or moisture can penetrate the brake and damage it. As a consequence, the brake system may fail.

– When removing the brake chamber, ensure that no dirt or moisture penetrates into the brake.



3. Unscrew the air connection (a) from the brake chamber according to the instructions of the brake chamber manufacturer.
4. Loosen the nuts (b) of the brake chamber using the socket wrench, AF 24 (external).
5. Remove the brake chamber from the caliper (1).

11.2 Installing the Brake Chamber

For this chapter you require the following tools:

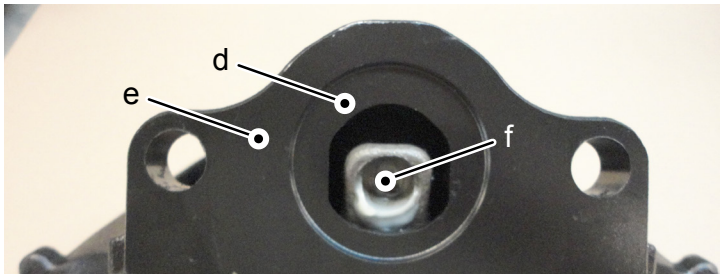
- Socket wrench, AF 24 (external) see page 15 (item VI)

⚠ WARNING

Risk of accident due to damaged brake

Dirt or moisture can penetrate the brake and damage it. As a consequence, the brake system may fail.

– When installing the brake chamber, ensure that no dirt or moisture penetrates the brake.



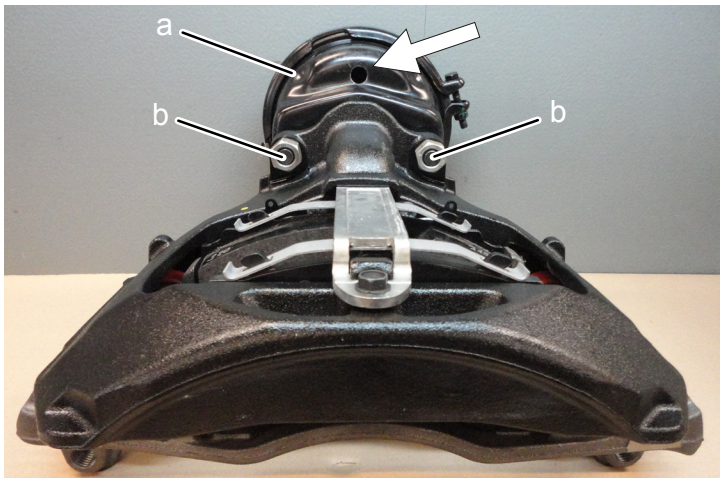
6. Clean the sealing surface (d) and flange surface (e) on the caliper (1).
7. Grease the lever cup with a pea-sized amount of grease in the brake lever (f) before installing the brake chamber.

   The grease WABCO EaseTec™ L1 is included in the respective repair kit.
8. Position the brake chamber on the caliper (1).

   ⇨ Depending on the installation position of the brake, ensure that the lower drainage opening of the brake chamber facing the ground is open.

   ⇨ Depending on the actuator type, the other drainage openings can either remain open or they must be sealed with a plug.

Always use **new** fastening nuts when fitting the brake chamber.



9. Screw new fastening nuts (b) onto the brake chamber by hand until the brake chamber fully rests on the caliper (1).

Replacing the Brake Chamber

10. Tighten the brake chamber symmetrically using a socket wrench with AF 24 (external) to avoid tilting. Tightening torque: 89 ft·lb (120 Nm)
11. Use a socket wrench, AF 24 (external) to tighten the fastening nuts (b). Tightening torque: 133 ft·lb - 155 ft·lb (180 - 210 Nm)
12. Screw the air connection (a) onto the brake chamber.

⚠ WARNING

Risk of accident due to damaged brake lines

If installed incorrectly, the brake lines can be damaged or bent, or rub against other components. As a consequence, the brake system may fail.

– Install the brake lines without twisting.

– Install the brake lines so that they do not rub against other parts.

13. Ensure that the brake hose does not exert initial stress on the sliding function of the brake caliper (1).
14. Ensure that the brake caliper (1) movement is not obstructed over the entire displacement path.
15. Check the air connection for leaks according to the instructions of the brake chamber manufacturer. Please review them before starting these actions.
16. Proceed with see chapter "15 Final Activities", page 61.

12 Replacing the Brake

12.1 Removing the Brake

For this chapter you require the following tools:

- Socket wrench, AF 30 (external) see page 15 (item III)
- 30 mm Adapter Wrench (if applicable), see page 18, tool Q

⚠ WARNING

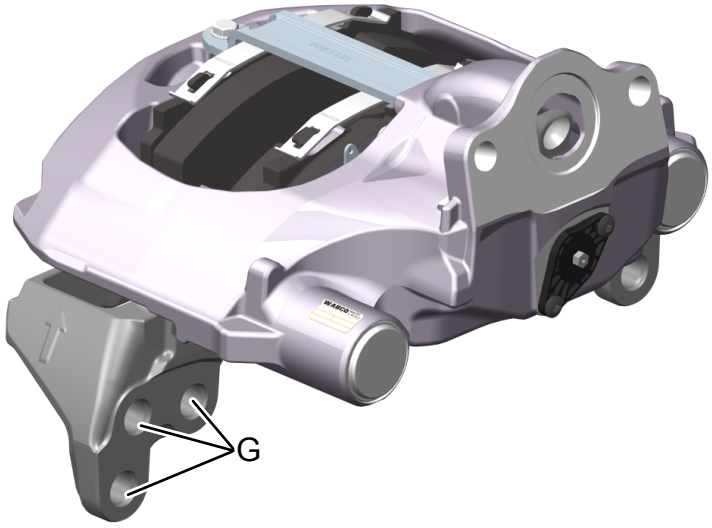
Risk of accident due to damaged bracket

Using the bracket as a grab handle or for fastening the brake to a lifting device can result in it being damaged.

If the bracket is broken or bent, the brake pads can no longer be held. There is a risk of accident.

– Never use the bracket as a grab handle or for fastening the brake to a lifting device.

1. Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer. Please review them before starting these actions.
2. Remove the brake chamber from the brake caliper (1) see chapter "11 Replacing the Brake Chamber", page 38.
3. Remove the brake pads (23, 24) see chapter "10.2 Removing the Brake Pads", page 31.



4. Loosen the fastening screws (G).

⚠ CAUTION

Risk of crushing for fingers and hands

Dismantling the brake caliper with the brake carrier from the axle can crush your fingers and hands.

– Make sure that your hands and fingers are free from pinch points to avoid crushing them.

5. Use a socket wrench with AF 30 (external) to remove the brake caliper (1) with brake carrier (2) from the axle.
6. Check the brake disc (rotor) see chapter "9.3 Checking the Brake Discs (rotor)", page 24.
7. Check the removed brake pads (23, 24).
8. Replace the brake pads (23, 24) as needed see chapter "10.5 Installing the Brake Pads", page 36.
9. Check the fastening flanges on the axle for wear and damage.
10. Clean the fastening flanges on the axle and remove any dirt, rust and grease.

12.2 Installing the Brake

For this chapter you require the following tools:

- Socket wrench, AF 30 (external) see page 15 (item III)

1. Remove all transport locks from the new brake.

2. Completely remove the adhesive foil (see white arrow) in the area of the cylinder from the brake caliper (1).

- The new brake without brake pads (23, 24) is supplied as a pre-assembled unit and may be mounted to the vehicle's axle via the brake carrier (2).
- Left and right brake must not be interchanged when they are installed on the axle. An arrow on the caliper (1) indicates which brake is correct for the left and which for the right axle side. This arrow indicates the brake disc's (rotor) direction of rotation during forward driving.

3. Place the new brake with brake carrier (2) over the brake disc (rotor).
4. Mount the brake to the axle according to the instructions of the axle or vehicle manufacturer. Please view them before starting these actions.

5. Use a socket wrench, AF 30 (external) to tighten the screws.
6. Install the brake pads (23, 24) see chapter "10.5 Installing the Brake Pads", page 36.
7. Adjust the air gap see chapter "10.6 Adjusting the Air Gap", page 37.

⚠ WARNING

Risk of accident due to defective brake chamber

A defective brake chamber can cause a braking system failure and must never be installed.

– If you notice any damage, replace the brake chamber.

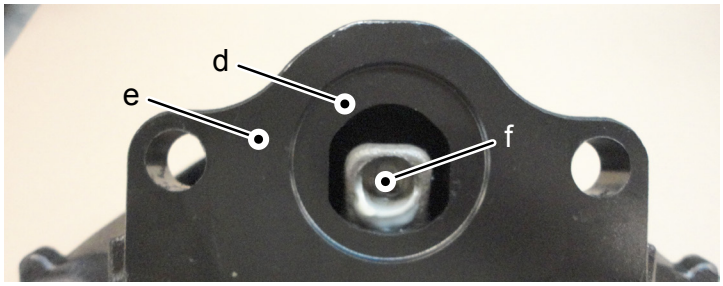
8. Check the brake chamber for damage, particularly at the inner area of the piston-rod seal.
9. If you notice any damage, replace the brake chamber see chapter "11 Replacing the Brake Chamber", page 38.

⚠ WARNING

Risk of accident due to damaged brake

Dirt or moisture can penetrate the brake and damage it. As a consequence, the brake system may fail.

– When cleaning the brake chamber, ensure that no dirt or moisture penetrates into the brake.



10. Clean the sealing surface (d) and flange surface (e) on the caliper (1).
11. Grease the lever cup with a pea-sized amount of grease in the brake lever (f) before installing the brake chamber.

    The grease WABCO EaseTec™ L1 is included in the respective repair kit.

12. Mount the brake chamber to the caliper according to the instructions of the brake chamber manufacturer (1) see chapter "11.2 Installing the Brake Chamber", page 39.
13. Check whether the wheel hub rotates freely.
14. Proceed with see chapter "15 Final Activities", page 61.

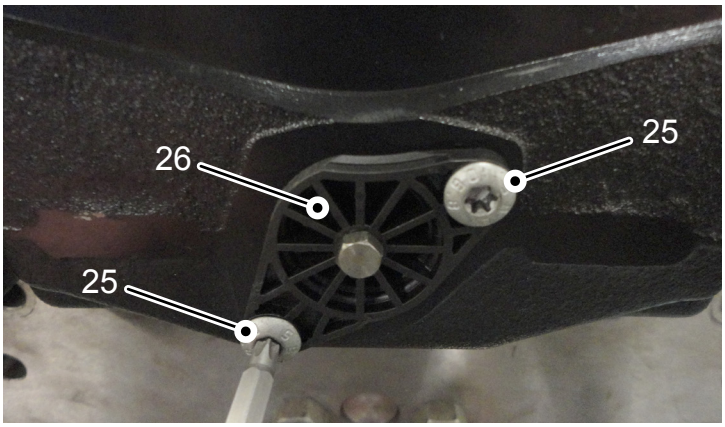
13 Replacing the Return Unit

13.1 Removing the Return Unit

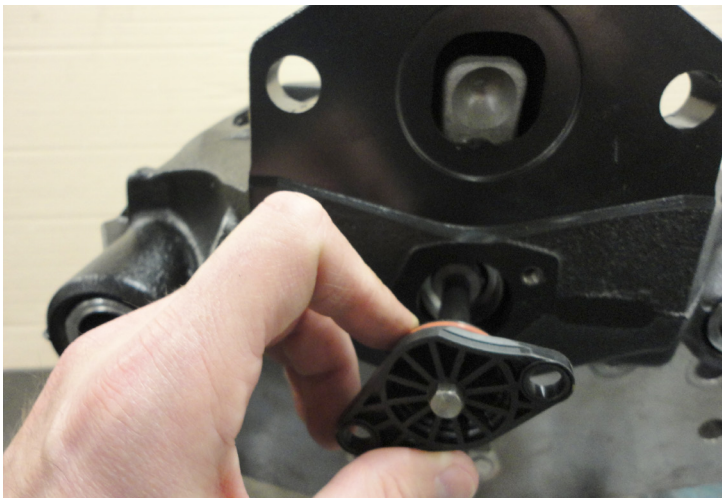
For this chapter you require the following tools:

- Torx® screwdriver, AF T30 (internal) see page 15 (item V)

1. Remove the brake chamber from the brake caliper (1) see chapter "11 Replacing the Brake Chamber", page 38.



2. Loosen the Torx® screws (25) of the return unit (26) using a Torx® screwdriver, AF T30 (internal).



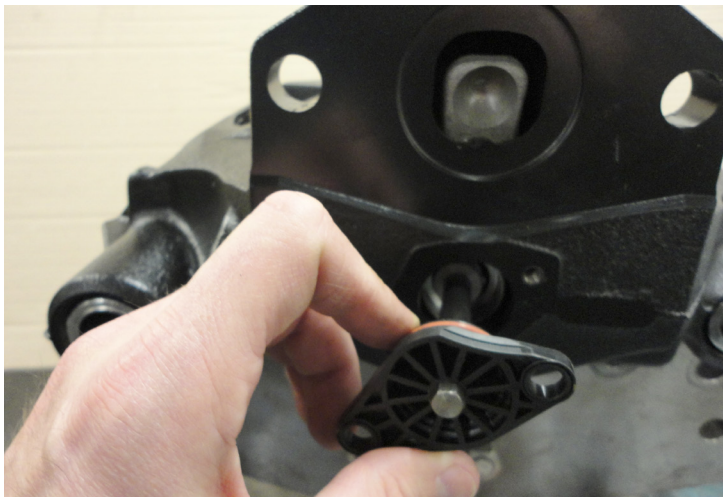
3. Pull the return unit (26) out of the brake caliper (1).
4. Clean the return unit (26) seat in the caliper (1).

Ensure that no dirt or moisture enters the brake when cleaning.

13.2 Installing the Return Unit

For this chapter you require the following tools:

- Torx® screwdriver, AF T30 (internal) see page 15 (item V)



1. Insert the **new** return unit (26) into the cleaned opening of the caliper (1).
2. Position the return unit (26) in accordance with the illustration.
3. Fasten the return unit (26) using a Torx® screwdriver, AF T30 (internal) and two new Torx® screws (25). Tightening torque: 5 ft·lb +1.5 ft·lb (7 +2 Nm).

⚠ WARNING

Risk of accident due to defective brake chamber

A defective brake chamber can cause a braking system failure and must never be installed.

– If you notice any damage, replace the brake chamber.

4. Inspect the brake chamber for damage, particularly at the inner area of the piston-rod seal.
5. If you notice any damage, replace the brake chamber see page 38.
6. Clean the sealing surface and the flange surface of the brake chamber.
7. Mount the brake chamber on the caliper (1) see page 39.

14 Replacing the Seals, Bushings and Protection Caps

- If all seals of the caliper (1) are replaced, the work steps for replacing the sealing covers (11) and bushings of the guiding bolts (22A and 22B) as well as the piston protection cap (20) can be carried out together.
- If the seals are replaced separately however, the work steps must be carried out separately according to the following chapters:
  Chapter "11.1 Replacing the sealing covers and bushings of the guiding bolts" and "11.2 Replacing the protection cap of the adjusting screw".

14.1 Replacing the Sealing Covers and Bushings of the Guiding Bolts

14.1.1 Dismantling the Bushings

For this chapter you require the following tools:

- Socket wrench, AF 30 (external) see page 15 (item III)
- Socket wrench, AF 14 (internal) see page 15 (item IV)
- WABCO tool set 300 100 014 2 see page 18
- Chisel or screwdriver
- Open-ended or ring wrench AF24
- Open-ended wrench AF27
- 30 mm Adapter Wrench (if applicable), see page 18, tool Q

⚠ WARNING

Risk of accident due to damaged bracket

Using the bracket as a grab handle or for fastening the brake to a lifting device can result in it being damaged.

If the bracket is broken or bent, the brake pads can no longer be held. **As a consequence, the brake system may fail.**

– Never use the bracket as a grab handle or for fastening the brake to a lifting device.

1. Remove the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer. Please review them before starting these actions.
2. Remove the brake chamber from the brake caliper (1) see chapter "11 Replacing the Brake Chamber", page 38.
3. Remove the brake pads (23, 24) see chapter "11 Replacing the Brake Chamber", page 38.

⚠ CAUTION

Risk of crushing for fingers and hands

After loosening the caliper, there is a risk of crushing your fingers and hands.

– Make sure that your hands and fingers are free from pinch points to avoid crushing them.

4. Remove the brake caliper (1) with brake carrier (2) from the axle using a socket wrench, AF 30 (external) see chapter "12.1 Removing the Brake", page 41.
5. Use a suitable fastening device (e.g. a vice) to clamp the brake to the brake carrier (2).

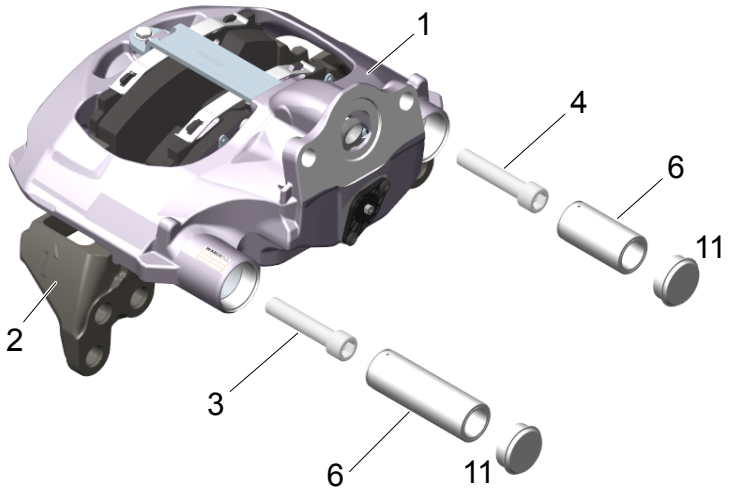
⚠ WARNING

Risk of accident due to damaged brake

Holes can be damaged if the tools are used incorrectly. Never place tools (e.g., chisel) onto the face side of the caliper. This can cause damage to the sealing surface and as a result dirt or moisture can penetrate the brake and damage it. As a consequence, the brake system may fail.

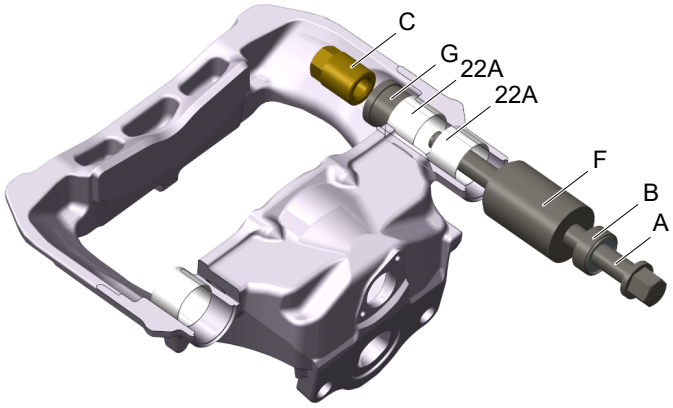
– Only attach the tool (e.g., chisel) to the sealing cover.

6. Remove the sealing cover (11) out of the brake caliper (1) using a chisel or screwdriver.
7. Loosen the socket-head cap screws (6) using a socket wrench, AF 14 (internal).



8. Remove the brake caliper (1) from the brake carrier (2).
9. Clean the contact areas (fitting collars) to the guiding bolts (3, 4) on the brake carrier (2).
10. Remove the guiding bolts (3, 4) from the caliper (1).

11. Remove the boots (guiding bolt) (21) out of the ring groove of the brake caliper (1).
12. To press out the bushes of the guiding bolts (22), place the brake caliper (1) on a firm surface.
    ⇨ The back of the caliper (1) must face upwards.



13. Use the WABCO tools A, B, C, F, and G to press the bushings (22A) of the long guiding bolt (fitting bolt) (3) and the bushing (22B) of the short guiding bolt (clearance bolt) (4) out of the brake caliper (1).

Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.

Do not put down the tool until the bushings (22A or 22B) have been pressed out of the caliper (1).

14. Clean the holes in the caliper (1).

14.1.2 Installing the Bushings

For this chapter you require the following tools:

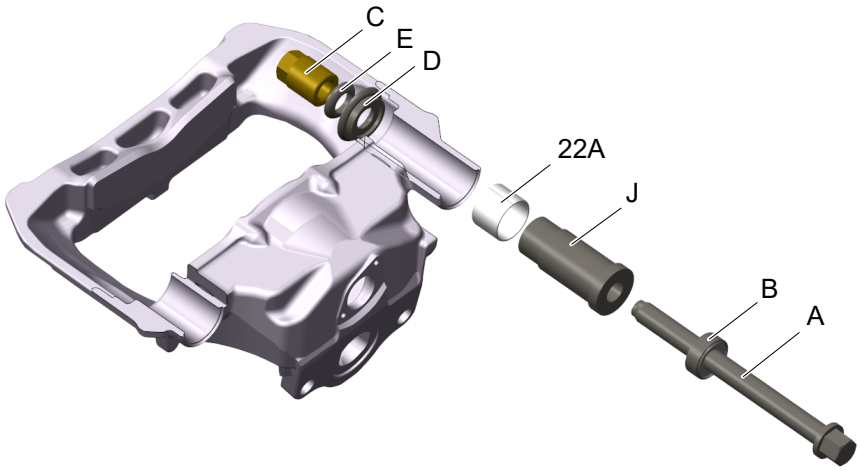
- WABCO tool set 300 100 014 2
- Rubber hammer
- Open-ended or ring wrench AF24
- Open-ended wrench AF27

Note the differences in the brake versions. The position of the long guiding bolt (fitting bolt) (3) depends on the brake variant and the installation situation and can be located at the entry as well as the exit side of the brake disc (rotor).

1. Grease the sliding surfaces of the bushings (22A and 22B).

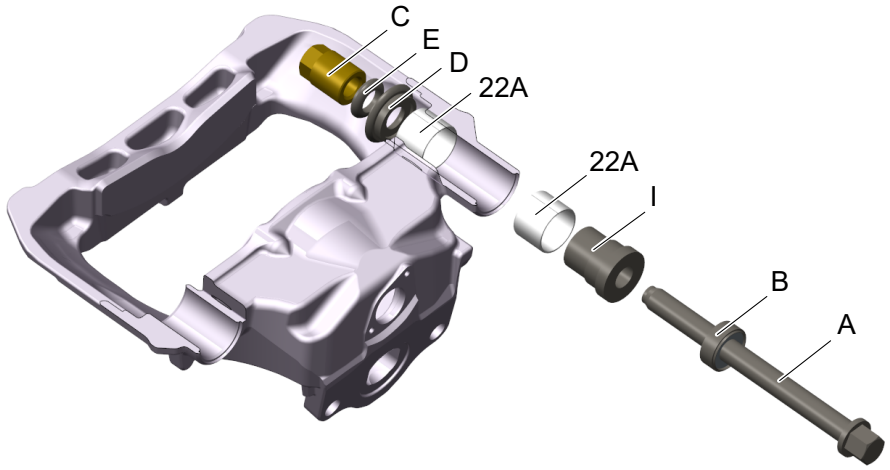
Replacing the Seals, Bushings and Protection Caps

Press in two new bushings (22A) for the long guiding bolt (fitting bolt) (3):



2. Use the WABCO tools A, B, C, D, E, and J to press the inner bushing (22A) into the hole of the caliper (1) until the tool stops.

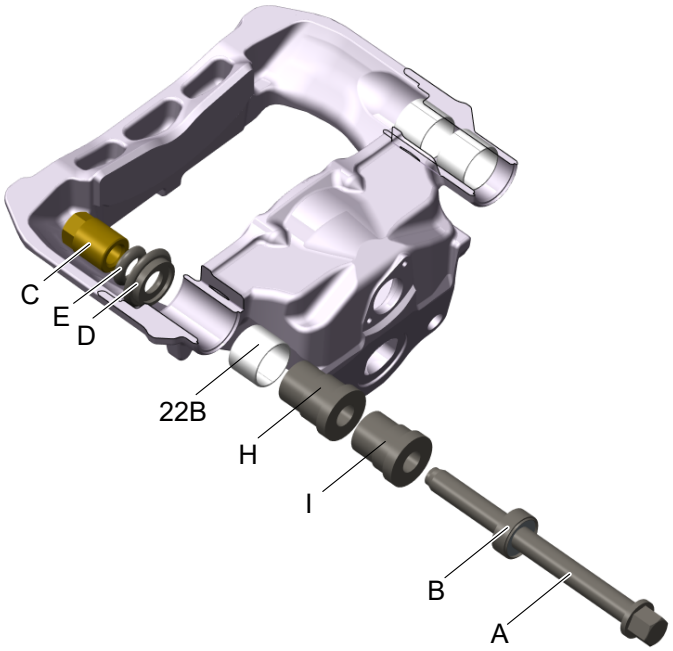
Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.



3. Use the WABCO tools A, B, C, D, E, and I to press the outer bushing (22A) into the hole of the caliper (1) until the tool stops.

Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.

⇨ The two bushings (22A) do not abut each other seamlessly.



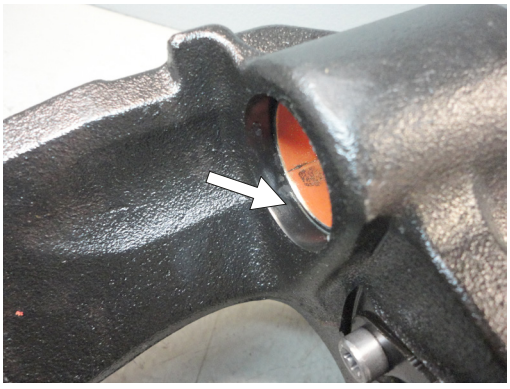
4. Use the WABCO tools A, B, C, D, E, and I to press a new bushing (22B) for the short guiding bolt (clearance bolt) (4) into the hole of the caliper (1) until the tool stops.

Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.

14.2 Replacing the Boots (guiding bolt)

For this chapter you require the following tools:

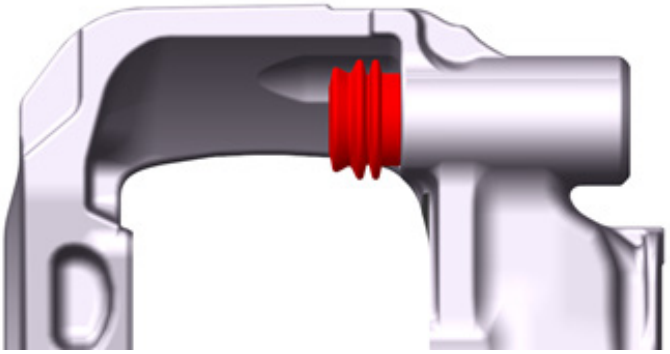
- Socket wrench, AF 30 (external) see page 15 (item III)
- Socket wrench, AF 14 (internal) see page 15 (item IV)
- WABCO tool set 300 100 014 2
- Rubber hammer
- Open-ended or ring wrench AF24
- Open-ended wrench AF27
- 30 mm Adapter Wrench (if applicable), see page 18, tool Q



Replacing the Seals, Bushings and Protection Caps

1. Clean the sealing seats (see white arrow) of the brake caliper (1) for the boots (guiding bolt) (21).

   ⇨ The cleaned sealing seats must be clean and free from grease.



2. Manually push two new boots (guiding bolt) (21) into the sealing seats of the brake caliper (1).
3. Grease the running surfaces of the guiding bolts (3, 4) and the edge bead of the boots (guiding bolt) (21).

Make sure that the boots (guiding bolt) (21) have an even and crease-free fit in the seal seat of the brake caliper (1).

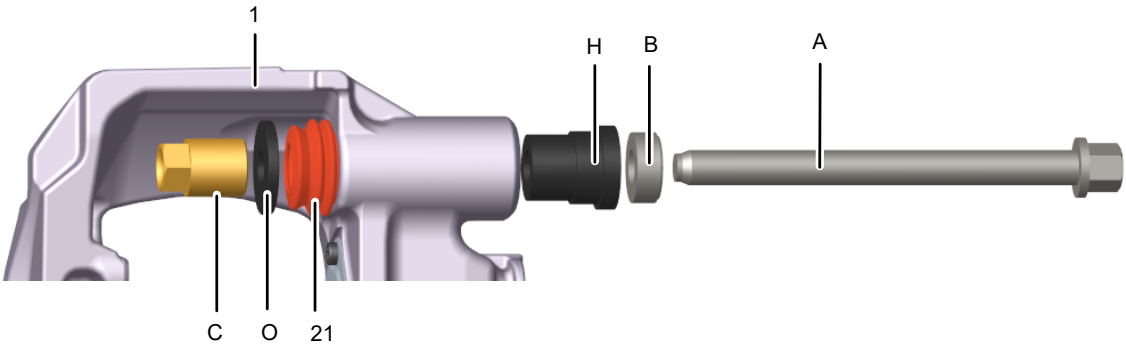
NOTICE

Damage to the boot (guiding bolt)

Do not exceed the maximum torque of 7 ft·lb (10 Nm) to avoid damaging the boot (guiding bolt).

– Use a torque below 7 ft·lb (10 Nm).

If you have tilted the tool O or the boot (guiding bolt) (21), loosen the tool and position it again. Pay attention to a maximum torque of 7 ft·lb (10 Nm) here as well.



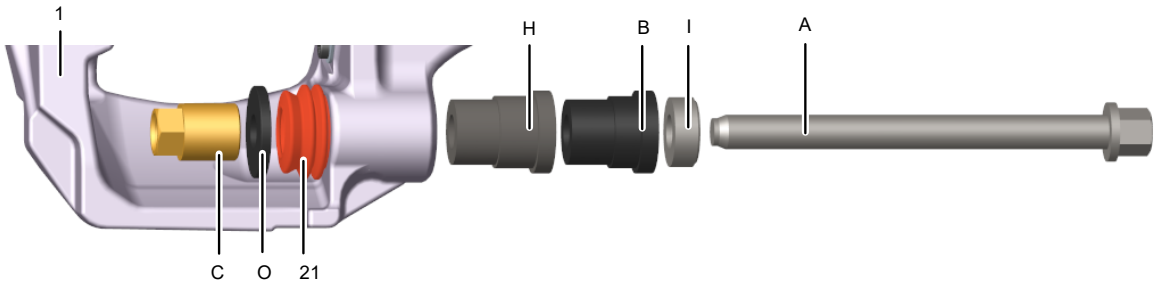
4. Use the tools A, B, C, H, and O to press the boot (guiding bolt) (21) into the seat of the caliper (1) on the fitting bolt side (long side).

Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.

Make sure that the boot (guiding bolt) (21) rests against the bushing.

Make sure that the boots (guiding bolt) (21) have an even and crease-free fit in the seal seat of the brake caliper (1).

Replacing the Seals, Bushings and Protection Caps



5. Use the tools A, B, C, H, and O to press the boot (guiding bolt) (21) into the seat of the caliper (1) on the clearance bolt side (short side).

Use an open-ended or ring wrench AF24 to turn the spindle, and an open-ended wrench AF27 to hold the nut.

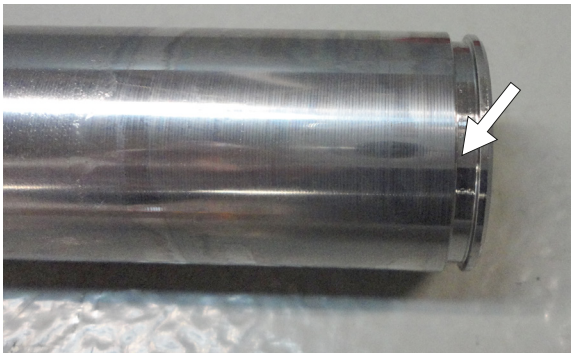
Make sure that the boot (guiding bolt) (21) rests against the bushing.

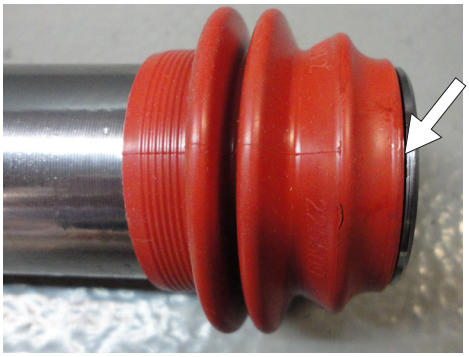
Make sure that the boots (guiding bolt) (21) have an even and crease-free fit in the seal seat of the brake caliper (1).

6. Insert the two **new** guiding bolts (3, 4) into the caliper (1) from the inboard.

Insert the longer guiding bolt (3) into the long guide with the two bushings (22A).

Insert the shorter guiding bolt (4) into the short guide (22B).





7. Push the boots (guiding bolt) (21) over the guiding bolts (3, 4) until the edge bead of the boot (guiding bolt) (21) rests in the ring groove (see white arrow).
8. Remove any excess grease.
   ⇨ The plane surfaces of the guiding bolts (3, 4) to the brake carrier (2) and the contact areas of the brake carrier (2) must be **clean and free of grease**.

Ensure that the edge bead of the boots (guiding bolt) (21) fits evenly and without creases in the seal seats of the guiding bolts (3, 4).

Replacing the Seals, Bushings and Protection Caps

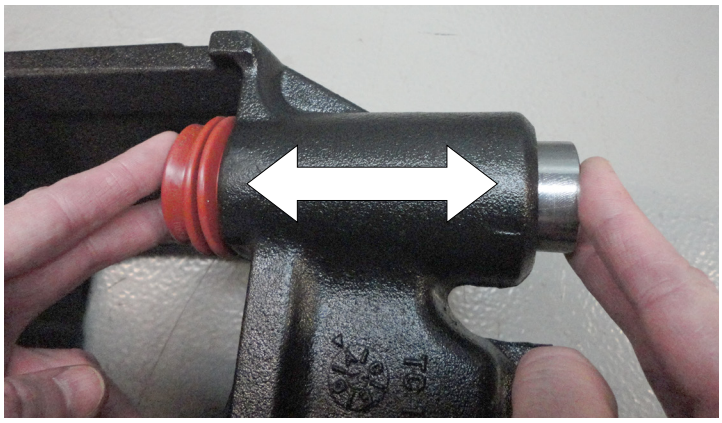
⚠ WARNING

Risk of accident due to damaged brake

During the movement of the caliper, there is a risk that the protective caps (boots) for guiding bolts are crushed against the brake carrier.

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail.**

– Ensure that the protection caps of the guiding bolts are not crushed against the brake carrier.



9. Manually move the guiding bolts (3, 4) back and forth in the bushings (22) to check for ease of movement.
10. Place the caliper (1) on the brake carrier (2) and the inserted guiding bolts (3, 4) into the fitting collar.

⚠ WARNING

Risk of accident due to damaged brake

The protective caps (boots) for guiding bolts may be damaged during assembly.

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail.**

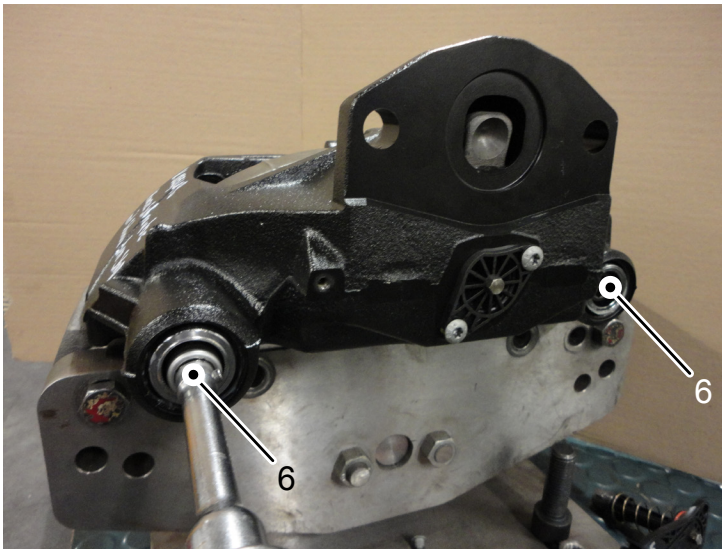
– During assembly, ensure that the protection caps for guiding bolts are not damaged or twisted while tightening the socket-head cap screws.

11. Insert two **new** socket-head cap screws (6) through the guiding bolts (3, 4) inserted in the caliper (1).

Always tighten the longer guiding bolt (fitting bolt) (3) with press-fit first and then the shorter guiding bolt (clearance bolt) (4) with clearance.

If the guiding bolts (3, 4) are loosened from the brake carrier (2) during maintenance work, you must use **new** socket-head cap screws (6) for reassembly. If (3, 4) are re-used they may not provide the same clamp load as new socket-head cap screws. This could cause the caliper to loosen from its connection to the carrier and consequently the braking system could fail.

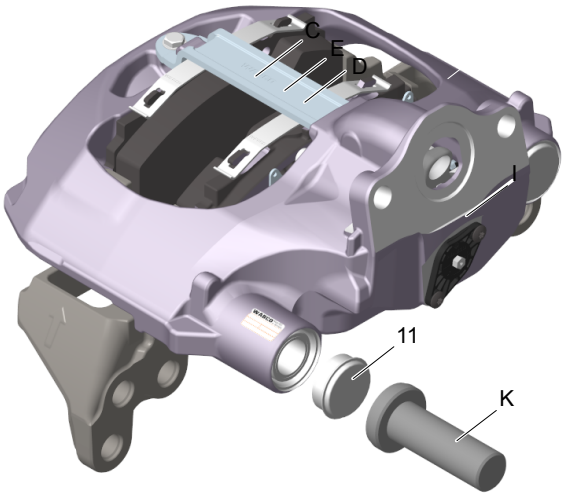
Replacing the Seals, Bushings and Protection Caps



12. Bolt the socket-head cap screws (6) using a socket wrench, AF 14 (internal) to the brake carrier (2). Tightening torque: 96 ft·lb +90° (130 Nm +90°) (angle controlled tightening)

13. Move the caliper (1) several times by hand on the guiding bolt (3, 4) over the entire displacement path to check for ease of movement (G).
14. Grease the holes for the sealing covers (11) in the brake caliper (1).
15. Push the caliper (1) against the brake carrier (2).
16. Insert new sealing covers (11) into the holes of the brake caliper (1).

Replacing the Seals, Bushings and Protection Caps



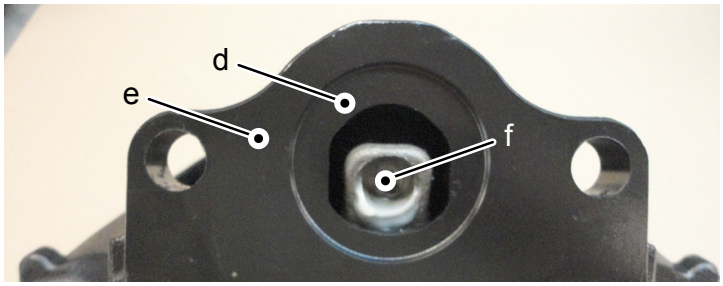
17. Using a rubber hammer and WABCO tool K, carefully drive in the sealing covers (11) as far as they will go.
18. Check the joining surfaces on the fastening flange of the axle and the brake carrier (2).
19. Remove any dirt, rust or oil.
20. Place the brake with brake carrier (2) over the brake disc (rotor).
21. Mount the brake to the axle according to the instructions of the axle or vehicle manufacturer. Please view them before starting these actions.
22. Use a socket wrench, AF 30 (external) to tighten the screws.
23. Assemble the brake pads (23, 24) see chapter "10.5 Installing the Brake Pads", page 36.
24. Adjust the air gap see chapter "10.6 Adjusting the Air Gap", page 37.

⚠ WARNING

Risk of accident due to damaged brake

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail**.

– When cleaning the brake chamber, ensure that no dirt or moisture penetrates into the brake.



25. Clean the sealing surface (d) and flange surface (e) on the caliper (1).
26. Grease the lever cup with a pea-sized amount of grease in the brake lever (f) before installing the brake chamber.

The grease WABCO EaseTec™ L1 is included in the respective repair kit.

⚠ WARNING

Risk of accident due to defective brake chamber

A defective brake chamber can cause a braking system failure and must never be installed.

– If you notice any damage, replace the brake chamber.

27. Check the brake chamber for damage, particularly at the inner area of the piston-rod seal.
28. If you notice any damage, replace the brake chamber see chapter "11 Replacing the Brake Chamber", page 38.
29. Clean the sealing surface and the flange surface of the brake chamber.
30. Mount the brake chamber to the caliper according to the instructions of the brake chamber manufacturer (1) see chapter "11.2 Installing the Brake Chamber", page 39.
31. Check whether the wheel hub rotates freely.
32. Proceed with see chapter "15 Final Activities", page 61.

14.3 Replacing the Piston Protection Cap

If the piston protection cap (20) is removed individually, caliper (1) and brake chamber must not be dismantled.

14.4 Removing the Piston Protection Cap

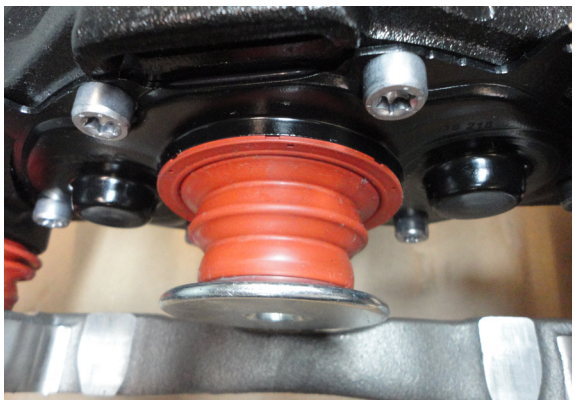
For this chapter you require the following tools:

- Socket wrench, AF 8 (external) see page 18 (item I)
- WABCO tool set 300 100 014 2 see page 18 (item IV)
- Screwdriver

1. Remove the brake pads (23, 24) see chapter "10.2 Removing the Brake Pads", page 31.
2. Push the caliper (1) completely to the inboard by hand.

Adjusting screw screwed in

Adjusting screw unscrewed



3. Turn the hexagon of the return unit (8) counterclockwise using a socket wrench, AF 8 (external) or using the WABCO tool P, until the adjusting screw is unscrewed approx. 30 mm.

4. Pull the piston protection cap (20) out of the ring groove of the piston (26).

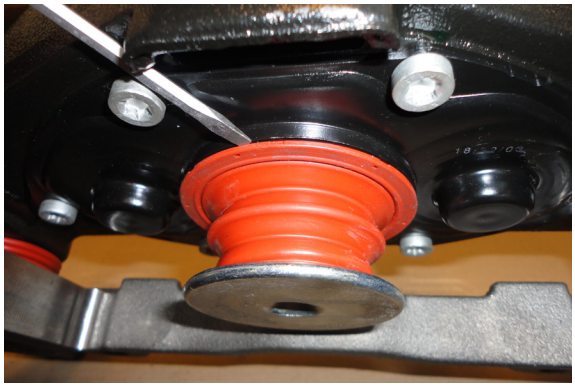
⚠ WARNING

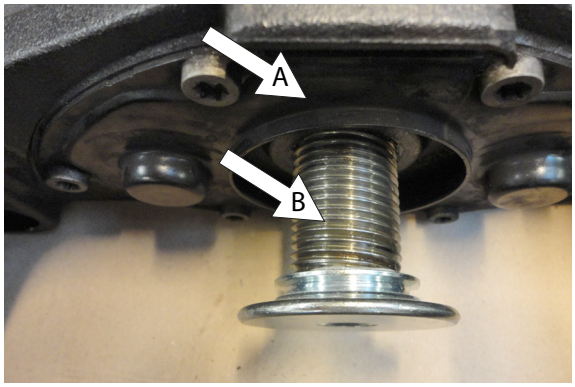
Risk of accident due to damaged brake

The sealing seat of the protection cap may be damaged by incorrect use of the screwdriver.

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail.**

– Position the screwdriver between the piston protection cap and the brake caliper.





5. Remove the piston protection cap (20) from the sealing seat of the brake caliper (1) with a screwdriver.
6. To do so, position the screwdriver between the piston protection cap (20) and the brake caliper (arrow A).
7. Check the cover (arrow A) on the brake caliper (1) for wear and damage.
8. Replace the brake see chapter "12 Replacing the Brake", page 41, if dirt or moisture has entered the brake or the seal seat in the caliper (1) is damaged.
9. Check the thread of the adjusting screw (arrow B) for corrosion and damage.
10. Replace the brake see chapter "12 Replacing the Brake", page 41, if the threads and/or visible internal brake parts are damaged or corroded.
11. Replace the piston protection cap (20) if dirt or water enters the caliper (1) through the seal seat, or if the piston protection cap (20) has been damaged during servicing.

⚠ WARNING

Risk of accident due to damaged brake

Dirt or moisture can penetrate the brake and damage it. **As a consequence, the brake system may fail.**

– When cleaning the brake chamber, ensure that no dirt or moisture penetrates into the brake.

12. Clean the sealing seats of the piston protection cap (20) in the caliper (1) and in the ring groove of the piston (26).

Make sure that the sealing seat for the piston protection cap (20) in the caliper (1) is clean and free from grease.

13. Turn the adjusting screw clockwise back into the caliper (1).

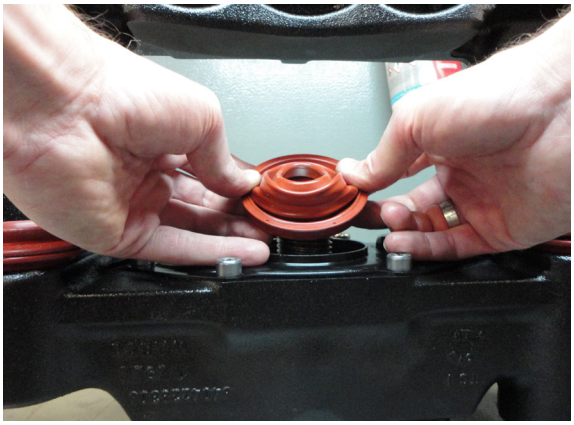
Replacing the Seals, Bushings and Protection Caps

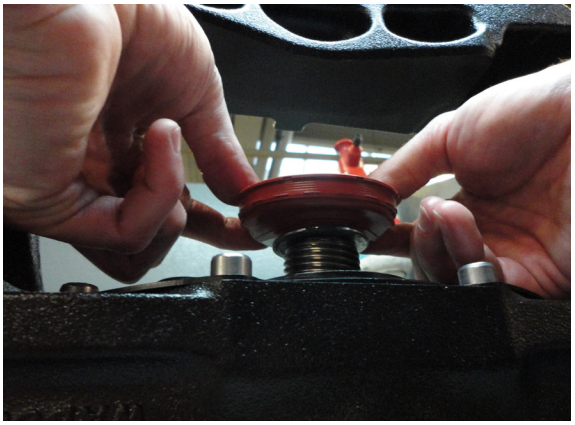
14.4.1 Installing the Piston Protection Cap

For this chapter you require the following tools:

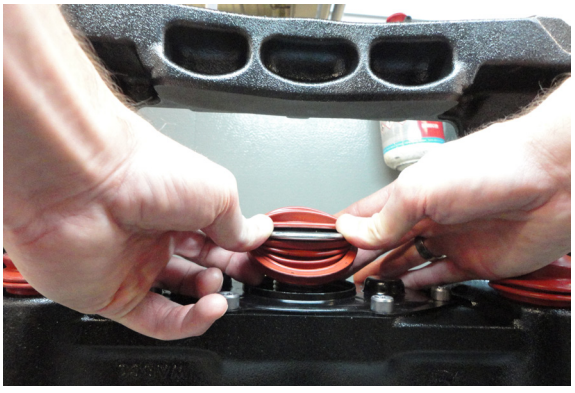
- Open-ended wrench, AF 24
- WABCO tool set 300 100 014 2

1. Grease the inner edge bead of the **new** piston protection cap (20) with a pea-sized amount of grease.





2. Slide the **new** piston protection cap (20) over the piston (26).

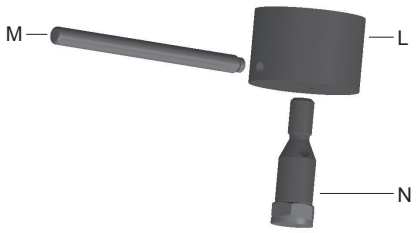


3. Then pull the outer seal over the piston (26) as well.

Replacing the Seals, Bushings and Protection Caps

4. Ensure that the edge bead of the outer seal is in the ring groove of the piston (26) and the edge bead of the inner seal is on the thread of the adjusting screw.

5. Center the piston protection cap (20).
6. Manually press the piston protection cap (20) against the seal seat (a) of the cover on the caliper (1).



7. Use the WABCO tools L, M, and N for the following action steps.
   Tool M is used for holding.
8. Turn the adjusting screw clockwise towards the caliper (1) so that the WABCO tool L can be placed on the piston protection cap (20).

Replacing the Seals, Bushings and Protection Caps

9. Center the WABCO tool L on the piston protection cap (20).
10. Turn the WABCO tool N by hand, until it rests against the caliper (1) on the opposite side.
11. To press in the piston protection cap (20), turn WABCO tool N using an open-ended wrench, AF 24, until the piston protection cap (20) lies flush in the seal seat of the caliper (1).

Ensure that the cap has a correct sealing seat in the brake caliper (1) and that the edge bead of the piston protection cap (20) has an even and crease-free fit in the ring groove of the piston (26).

12. Install the brake pads (23, 24) see chapter "10.5 Installing the Brake Pads", page 36.
13. Adjust the air gap see chapter "10.6 Adjusting the Air Gap", page 37.
14. Proceed with see chapter "15 Final Activities", page 61.

15 Final Activities

After successful installation of the disc brake, ensure the following:

– Make sure that the release screw of the spring chamber cylinder is fully tightened.

– Install the vehicle wheel in accordance with the instructions of the axle or vehicle manufacturer.

– Check the parking brake for correct function.

– Carry out a final test on the roller test stand.

– If no roller test stand is available, conduct a test drive with brake action tests.

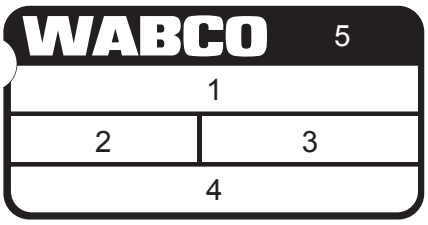
– Inform the driver that full braking (with the exception of emergency braking) is not permitted during the first 50 K 31 miles after new brake pads have been fitted. Beddng the brake pads with normal braking application for this distance helps transfer an even layer of brake pad material onto the brake rotor. This transfer layer assists in smoother brake operation and improved braking power. Improper bedding can lead to an uneven transfer layer which may result in a feeling of brake pulsation.

– Inform the driver that they should avoid prolonged braking, so that no heat cracks form and the brake does not warp.

16 Spare Parts

– Identify the brake by means of the WABCO part number.

WABCO type plate



1	Customer number
2	Production date
3	Serial number
4	Assembly number
5	Country of manufacture

Use the following site to find spare parts using the WABCO part number:
https://www.wabco-na.com/

17 Disposal

- The final and professional decommissioning and disposal of the product must be carried out in accordance with the applicable legal regulations of the user country and state. In particular, the regulations for the disposal of batteries, equipment and the electrical system must be observed.
- Electrical appliances must be collected separately from household or commercial waste and recycled or disposed of in accordance with regulations.
- If applicable, take the old device to the company's internal disposal department, which will then forward it to specialist companies (specialist disposal companies).
- In principle, it is also possible to return the old device to WABCO. For this purpose, contact the WABCO Customer Care Center at (855) 228-3203, by email wnacustomercare@wabco-auto.com or visit our website at www.wabco-na.com. Any special agreements must be observed.
- Electrical and electronic equipment must be collected separately from unsorted municipal waste and recycled or disposed of properly, because harmful substances can cause lasting damage to health and the environment if disposed of improperly.
- Detailed information can be obtained from specialist waste management companies or the responsible authorities.
- The packaging must be disposed of separately. Paper, cardboard and plastics must be recycled.

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For further product details contact your distributor or the WABCO Customer Care Center at 855-228-3203.

About ZF Friedrichshafen AG

ZF is a global technology company and supplies systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. ZF allows vehicles to see, think and act. In the four technology domains Vehicle Motion Control, Integrated Safety, Automated Driving, and Electric Mobility, ZF offers comprehensive solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. ZF electrifies different kinds of vehicles. With its products, the company contributes to reducing emissions and protecting the climate.

ZF, which acquired WABCO Holdings Inc. on May 29, 2020, now has 162,000 employees worldwide with approximately 260 locations in 41 countries. In 2019, the two then-independent companies achieved sales of €36.5 billion (ZF) and $3.4 billion (WABCO). For more information, visit: **www.wabco-na.com**

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