Area of application

This publication describes maintenance and repair of the mechanical sliding disc brake caliper MAXXUS 22 (for US market) including the individual operations and work processes required to replace components using available repair kits.

Wheel brake product numbers:
640 322 050 0 (left)
640 322 051 0 (right)
640 322 065 0 (left replacement brake)
640 322 066 0 (right replacement brake)

This publication is directed at trained service technicians employed at workshops for commercial vehicles.
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1 Disclaimer

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2 Symbols used

**DANGER**  Imminent hazard situation which can cause serious personal injury or death if the safety instruction is not observed.

**WARNING**  Potential hazard situation which can cause death or serious personal injury if the safety instruction is not observed.

**CAUTION**  Potential hazard situations that can cause minor or moderate personal injury if the safety instruction is not observed.

! Important instructions, information, or tips that you should always observe.

🌐 Reference to information, publications etc. on the Internet

- List
  - Step
    ➔ Consequence of an action
3 Safety Instructions

Observe all necessary provisions and instructions

– Read this publication thoroughly.
– Adhere to all instructions, information and safety information to prevent injury to persons and damage to property.
– Make sure you strictly follow the specifications and instructions of the vehicle manufacturer.
– Adhere to all company safety regulations as well as regional and national regulations.

Meet all provisions for a safe work environment

Only trained and qualified technicians are to perform any work on the vehicle.
– Use personal protective equipment if required (protective goggles, respiratory protection, ear protectors, etc.).
– A second technician must assist during removal and installation of the brake. Pedal actuations can lead to severe injuries if persons are in the vicinity of the vehicle. Make sure that pedals cannot be actuated as follows:
  – Switch the gearbox to "neutral" and actuate the hand brake.
  – Use chocks to secure the vehicle against rolling.
  – Fasten a visible note to the steering wheel indicating the work is being performed on the vehicle and that the pedals must not be operated.

Observe the following instructions for a safe repair

– Perform the repair work using only the recommended tools, see chapter 7.1.1 "WABCO tool sets", page 59. Do not use motor-driven screw tools or torque tools.
– Only use original WABCO parts and approved brake linings and hold down systems for brake pads and spreader plates.
– Always replace brake linings by axle and use a new hold down system for brake pads and spreader plates.
– Tighten screws and nuts only with the specified spanners, applying only the specified tightening torque, see chapter 7.1.2 "Tightening torques", page 60.
– Never attach a lifting device to the pad hold down bracket as the bracket could be damaged.
– Do not open the brake caliper with the clamping unit and do not loosen the hold down screws on the brake caliper cover.
– Do not apply the brake when brake pads have been removed.
– While working at the brake or moving of the brake caliper, handle the brake caliper only from the outside to avoid injury! A second technician must assist during removal and installation of the brake.
– Use suitable equipment, such as a vice, to clamp the brake when performing repairs on the brake outside the vehicle.
– In general it is not allowed to disassemble the brake caliper and remove the clamping unit inside. I. e. does not remove the cover made from sheet material facing to the rotor or untighten the screws.
– The flawless mechanical condition of the disc brake is of utmost importance to ensure good driving and safe braking characteristics.
– Only grip the brake on the outside with your hands while moving the brake caliper or working on the brake.
– Do not use compressed air or other high-pressure devices when cleaning the brake or the vehicle. This may result in the risk of personal injury or hazardous dusts. Rubber parts of the brake could also be damaged.
– Replace immediately worn, scorched, glazed, or oily brake pads with a new brake pad hold down system for pads and spreader plates on a per axle basic. Spread plate is a reusable part
– Damaged components will affect braking performance. If a component is damaged, please replace or repair it immediately.

Perform tests after repair work
– Perform a final roller stand test after completing the repairs. If no roller test stand is available, conduct a test drive with brake application tests.
– Make sure that the release screw of the spring brake chamber is threaded completely in after completing the maintenance and installation work and check the functionality of the parking brake.

Post-repair procedure
– Do not perform full braking (with the exception of emergency braking) during the first 31.2 miles (50 kilometers) after new brake pads have been fitted. Also avoid continuous braking over longer periods. Ensure that the driver of the vehicle is informed.
– Visually inspect the wear limits of the brake pads and rotor. When brake pads or the discs are damaged, or worn beyond their specified minimum thickness, brake effectiveness will diminish and possibly result in an accident.
4 Description of MAXXUS 22

Characteristics

- mechanical sliding disc brake caliper
- pneumatic single piston brake
- for use in commercial vehicle and trailer service, auxiliary and parking brake applications
- for front and rear axles with 22.5" and 24.0" wheel sizes
- actuated mechanically via a diaphragm brake or spring brake chamber which is mounted to the end of the brake caliper

The complete disc brake including air chamber consists of two assemblies: brake caliper (1) and brake carrier (2), see following figure.
The brake caliper (1) slides on guide pins (10, 11) mounted on the brake carrier (2). The brake pads (35, 36) are held in the brake carrier by a pad hold down bracket (38) and hold down springs (37). Therefore the brake force is transmitted to the faces of the brake carrier.

The open design of the brake caliper allows quick and simple changes of the brake pads.
The actuation unit of the brake is equipped with an automatic adjuster to compensate for wear of the brake pads and discs. This automatic adjuster, independent of load and operating conditions, maintains a constant predetermined gap between brake pads and discs. This, together with the robust and stiff construction of the brake caliper, ensures safe operation of the brake system and increases safety margins during emergency stopping.

The internal moving components of the brake are lubricated for life, and all sealing components are maintenance free.

**CAUTION**

Damaged components will affect braking performance

- Please replace all damaged components.
5 Checking the brake

– Observe all safety instructions to avoid personal injury or material loss, see chapter 3 "Safety Instructions", page 8. These instructions must be observed to avoid personal injury or material loss.

⚠️ Do not use power-driven tools.
While working at the brake or moving of the brake caliper handle the brake caliper only from outside.

⚠️ The brake chamber does not need to be dismantled in order to check the brake.
The brake is shown without the brake chamber for illustration purposes only.

5.1 Wheel ON Pad Wear Measurement

Depending on ease of access to the long or short guide pin measure the distance between the machined carrier surface (arrow grey) and outer edge of the guide pin (arrow white).

Pad Wear limit long guide pin:
> 130 mm / > 5.1 inch = replace brake pads see chapter 6 "Replacement", page 28.

Pad Wear limit short guide pin:
> 90 mm / > 3.5 inch = replace brake pads see chapter 6 "Replacement", page 28.

5.2 Checking the manual brake adjuster

⚠️ Directions of rotation and torques of the hexagon nut of the adjuster are listed in the appendix, see chapter 7.1.2 "Tightening torques", page 60.
Brake pads and spreader plate must be fitted in order to check the manual brake adjuster.

– Remove the plug (31) of the manual brake adjuster (30) from the brake caliper.
– Visually inspect the hexagon nut and the seal system of the manual brake adjuster (30) for wear and damage.
– Replace damaged or worn parts, see chapter 6 "Replacement", page 28.

CAUTION

Damage to hexagon nut

Do not use an open end spanner or a motor-driven screw- or torque-tool for the hexagon nut of the manual brake adjuster (30). Never put excessive pressure on the hexagon nut. Otherwise the hexagon nut will be damaged.
– Exclusively use tools from appendix, see chapter 7.1.1 "WABCO tool sets", page 59.

– Use the ring spanner and extension tool to turn the hexagon nut of the manual brake adjuster (30) about ½ to ¾ of a turn counter clockwise.

Checking the adjustment is only possible with a larger gap 0.078-0.12 in (2-3 mm). There must be sufficient space for the engaged ring spanner; it must not be obstructed when it is turned during adjustment.

– Gently apply the brake 5 times at braking pressure approx. 14.5 PSI (1 bar).

  ➔ With increased adjustment the angle of rotation of the engaged ring spanner becomes smaller with each actuation.
  
The manual brake adjuster is working correctly if the ring spanner rotates clockwise as described above.

– Remove the ring spanner and extension tool from the hexagon nut of the manual brake adjuster (30).
– Install the plug (31) into the manual brake adjuster and ensure that the plug has a tight seat.

Faults that might occur

a) The manual brake adjuster (30) or the attached ring spanner does not turn.
b) The manual brake adjuster (30) or the attached ring spanner does rotate with the initial brake action.
c) The manual brake adjuster (30) or the attached ring spanner does rotate forward and backward with every brake action.

In these cases the manual brake adjuster is faulty and the brake must be replaced, see chapter 6.3 "Replacing the brake", page 34.
5.3 Checking the caps and the ability of the brake caliper to move

Do not use power-driven tools. While working at the brake or moving of the brake caliper handle the brake caliper only from outside.

The brake chamber does not need to be dismantled in order to check the brake. The brake is shown without the brake chamber for illustration purposes only.

- Manually move the brake caliper on the s (10, 11) across the entire displacement path and check for ease of movement.

Do not squeeze the guide pin seals (5) against the brake carrier while moving the brake caliper as it may damage the seals.

⇒ Replace the guide pin bushings, guide pins (10, 11) and guide pin seals (5) if the brake caliper moves sluggishly, see chapter 6 "Replacement", page 28.

- Push the brake caliper (1) towards the brake chamber side by hand.
- Check the seals (5) of the guide pins (10, 11) for wear and damage.
  ⇒ Replace any defective seals (5), see chapter 6 "Replacement", page 28.
- Insert the spreader plate (19) into the brake carrier and push the spreader plate against the adjuster screw (21).
The pin of the manual brake adjuster nut has to engage with the groove of the spreader plate. Turn the adjuster screw until the pin meshes with the groove of the spreader plate. Ensure that the guide pin seal is not twisted.

The spreader plate has to be placed in the guideway (arrow) of the brake carrier and is to cover the entire surface of the guide bar of the brake carrier. Otherwise the spreader plate could slide out of the guiding. If required, push the brake caliper a little towards the rim side.

- Use the ring spanner with extension tool to turn the hexagon nut of the manual brake adjuster (30) clockwise until the adjuster screw (21) is out about 1.18 in (30 mm).

- Take the spreader plate (19) out of the brake carrier.
- Check the adjuster screw seal (6) for wear and damage.
  - If the adjuster screw seal (6) is damaged, check whether dirt or moisture has penetrated into the brake's interior parts or has damaged the brake caliper due to corrosion. Renew the brake if you have identified damage or corrosion, see chapter 6 "Replacement", page 28.
  - Replace the adjuster screw seals if they are damaged during service work on the brake, see chapter 6 "Replacement", page 28.
- Check the position of the pin on the adjuster screw (21).
  The pin must always be on the side that faces the brake disc runout (see white arrow in following figure).
Checking the brake

– Insert the spreader plate (19) into the brake carrier and push the spreader plate against the adjuster screw (21).

The pin of the adjuster screw must mesh with the groove of the spreader plate. Otherwise the adjustment will not function.

Turn the adjuster screw until the pin meshes with the groove of the spreader plate. Ensure that the adjuster screw seal is not twisted.

The spreader plate has to be placed in the guideway (see white arrow in figure above) of the brake carrier and is to cover the entire surface of the guide bar of the brake carrier. Otherwise the spreader plate could slide out of the guiding.

---

CAUTION: **Damage to adjuster screw seal**

There is a risk of the adjuster screw turning simultaneously, which could damage the adjuster screw seal (6).

– While turning the hexagon nut, use your hand to push the spreader plate (19) towards the brake chamber side to ensure that the pin as an antirotation element for the adjuster screw does not slip out of the retaining groove of the spreader plate.

– Use the ring spanner with extension tool to turn the hexagon nut of the manual brake adjuster (30) counter clockwise until the adjuster screw (21) is about 30 mm in the brake caliper again.
5.4 Checking and removing brake pads

Brake pad measurement

- 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.
- Replace burned, glazed or oil contaminated brake pads immediately.
- Replace brake pads at material thickness less than 0.43 in (11 mm) (see following figure, A) immediately.
  Always replace all brake pads by axle, using a new retaining system for brake pads and spreader plates.
  To avoid damaging the brake disk replace the brake pads no later than at the point when they reach the wear limit at their thinnest spot.
  The remaining brake pad thickness should not be less than 0.078 in (2 mm) over the backing plate thickness (see following figure, C).

Legend

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. material thickness 0.43 in (11 mm)</td>
<td>Total material thickness – new 1.18 in (30 mm)</td>
<td>Min. remaining brake pad thickness 0.078 in (2 mm)</td>
</tr>
</tbody>
</table>
Removing the brake pads

– Remove the wheel in accordance with the instructions of the axle or vehicle manufacturer.
– Loosen the socket head screw (39) from the pad hold down bracket (38), see chapter 7.1.2 Tightening torques, page 60 => Position II. Put slight pressure on the pad hold down bracket (38) with your hand at the same time.

– Remove the pad hold down bracket (38) from the brake caliper.

– Remove the hold down springs (37) from the spreader plate (19). Spread plate should be reused if found to be in good working condition.
– Remove the plug (31) of the manual brake adjuster (30).

– Check the manual brake adjuster (30) and the thickness of the sleeve for wear and damage.
  ➔ Replace the manual brake adjuster (30), if you notice wear or damage, see chapter 6 "Replacement", page 28.
– De-adjust the brake by rotating the hexagon nut on the manual brake adjuster (30) with the ring spanner with extension tool. Then release by approximately 1/4 turn.

CAUTION
Damage to adjuster screw seal

There is a risk of the adjuster screw turning simultaneously, which could damage the adjuster screw seal.
– While turning the hexagon nut, use your hand to push the spreader plate (19) towards the brake chamber side to ensure that the pin as an anti-rotation element for the adjuster screw does not slip out of the retaining groove of the spreader plate.
**CAUTION** Damage to brake parts

Brake parts can be damaged when applying brake with removed brake pads.
- Do not apply the brake when brake pads have been removed.

- Push the brake caliper to the rim side (see white arrow in following figure) by hand and remove the brake pad (35) with the hold down spring on the rim side.

- Push the brake caliper to the brake chamber side (see white arrow in following figure) by hand and remove the brake pad (36) with the hold down spring on the brake chamber side.

- Take the spreader plate (19) out of the brake caliper.

- Check the spreader plate (19) for excessive corrosion and damage.
  - Replace the spreader plate if you have identified damage. Replacing the spreader plates must always be by axle on both the left and right brakes.
– Use a wire brush to clean spreader plate, pad slots and spreader plate guide on the brake caliper and remove any corrosion on these components. Ensure not to damage the adjuster screw seals (5, 6).

The guide surfaces of the pad slots on the brake carrier must be clean and free from grease.

5.4.1 Taper wear measuring and inspecting of brake pad

Brake pad of the inboard side measure
– Measure the minimal material thickness of pad (include pad back plate) at the measuring points 1 and 2, see figure above.
– Record the measured values of measuring points 1 and 2 according to the diagram, see following figure.

Brake pad of the outboard side measure
– Measure the minimal material thickness of pad (include pad back plate) at the measuring points 1 and 2, see figure above.
– Record the measured values of measuring points 1 and 2 according to the diagram, see following figure.

The taper wear is acceptable, if the intersection of the registered measured values lies within the acceptable range.
With Off-road application the boundary (solid line) range is likewise acceptable. If the values lie outside of the marked range, the brake pads must be replaced.
5 MAXXUS 22

Checking the brake

5.5 Checking the brake discs

- Remove the brake pads, see chapter 5.3 "Checking and removing brake pads", page 18.
- Measure the brake disc thickness at the contact area of the brake pads.

**Legend**

<table>
<thead>
<tr>
<th>D</th>
<th>Overall thickness new brake disc 1.77 in (45 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Wear limit – at least 1.45 in (37 mm) or to specifications of the axle or vehicle manufacturer</td>
</tr>
</tbody>
</table>

**WARNING** Risk of accident during discs checking and measurement

Worn-out pads and discs reduce the brake effectiveness and can cause brake failure.
- Observe brake pads and disc wear limits. Discs must be free of oil.

**Legend**

<table>
<thead>
<tr>
<th>A</th>
<th>Web-like crack formation: permissible</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Radial cracks up to max. 0.019 in (0.5 mm) width: permissible</td>
</tr>
<tr>
<td>C</td>
<td>Unevenness of the disc surfaces up to max. 0.059 in (1.5 mm) deep: permissible</td>
</tr>
<tr>
<td>D</td>
<td>Continuous cracks: not permissible</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a</th>
<th>Width of the braking area</th>
</tr>
</thead>
</table>
Checking the condition of the brake disc

- Check the brake disc for cracks and the condition of the surface.
- We recommend always replace discs on a per axle basis. Generally after the installation of new discs we recommend to replace the brake pads as well.

Checking disc run-out

- Mount a dial indicator on the brake carrier, see chapter 5.5 "Checking the bearing play of the guide pin", page 26.
- Fasten the dial indicator to the brake caliper.
- With the brake disc installed, check the disc runout by rotating the wheel hub, see following figure.
  Limit value: 0.0059 in (0.15 mm)

⚠ At higher values replace the disc / discs.
Install only a cleaned disc. Disc must be free of oil.
5.6 Checking the bearing play of the guide pin

- Remove the wheel according to the vehicle manufacturer instructions.
- Remove the brake pads and spreader plate, see chapter 5.3 "Checking and removing brake pads", page 18.
- Push the brake caliper completely to the rim side by hand.
- Clean the measuring point.
  The measuring point is the cast edge on the brake caliper on the rim side.
- Fasten the magnetic dial indicator support to the brake carrier or the axle.
- Press the dial indicator against the measuring point (see white arrow in the following figure) on the brake caliper.

- Applying little force, tilt the brake caliper as far as possible (direction as shown in the figure) and set the dial indicator to the value zero.

- Applying little force, tilt the brake caliper as far as possible in the opposite direction. Repeat as needed.
- Read the maximum value on the dial-gauge.
  The measured guide pin clearance may not be larger than 0.078 in (2 mm).
  Replace the parts, if the measured guide pin clearance is greater than 0.078 in (2 mm), see chapter 6 "Replacement", page 28.
- Read the dial indicator.
  The bearing play must not be greater than 0.078 in (2 mm).
  Replace the bushings of the guide pins, if the measured bearing play is greater than 0.078 in (2 mm), see chapter 6.4.1 "Replacing the caps and bushings for the guide pins", page 37.
- Remove the measurement device.
– Install spreader plate and brake pads and adjust the clearance, see chapter 6.1 "Replacing the brake pads", page 28.
– Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
– Having completed the work, test the brake on a roller test stand.
6 Replacement

– Observe all safety instructions to avoid personal injury or material loss, see chapter 3 "Safety Instructions", page 8. These instructions must be observed to avoid personal injury or material loss.

The brake chamber does not need to be dismantled in order to check the brake. The brake is shown without the brake chamber for illustration purposes only. Always replace the brake pads per axle and use a new retaining system for brake pads and spreader plates. Pad hold down bracket is already mounted on the brake caliper.

6.1 Replacing the brake pads

The spreader plate (19) is already installed.

– Put a new brake pad (35) into the outboard side.

– Push the brake caliper (1) towards the brake chamber side until the brake pad (35) of the rim side bears against the brake disc.

– Put a new brake pad (36) into the inboard side.

– Push the brake caliper towards the outboard side until the brake pad (36) of the inboard side bears against the brake disc.

– Adjust the clearance by means of a 0.047 in (1.2 mm) feeler gauge (see white arrow in following figure).
For this purpose insert the feeler gauge between the brake pad of the rim side and the brake caliper.

Turn the hexagon nut of the manual brake adjuster (30) anticlockwise with a ring spanner and extension tool until both brake pads bear on the brake disk.

**CAUTION**
Do not use an open end spanner or a motor-driven screw- or torque-tool for the hexagon nut of the manual brake adjuster (30). Never put excessive pressure on the hexagon nut. Otherwise the hexagon nut will be damaged.

Exclusively use tools from appendix, see chapter 7.1.1 "WABCO tool sets", page 57.

Mount the lining retainer pin only after you have adjusted the clearance.

Remove the feeler gauge.

Install a new hold down spring (37) on the spreader plate (19).

Insert the new pad hold down bracket (38) into the openings of the brake caliper (1) and press the pad hold-down bracket so that the hold down springs fit into the bracket.
- Press the pad hold down bracket (38) against the brake caliper (1) and fasten a new socket head screw (39) on the brake caliper, see chapter 7.1.2 Tightening torques, page 60 => Position II.

- Push a new plug (31) into the opening of the brake caliper. Make sure that the plug has a tight seat.

- Check the wheel hub for ease of movement.
- Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Having completed the work, test the brake on a roller test stand.
6.2 Replacing the brake chamber

Only use brake chambers as specified by vehicle manufacturer. The following maintenance steps only inform in principle about the assembly and disassembly of the brake chamber. Detailed assembly and check instructions have to be used according to the brake chamber type and the instructions of the brake chamber manufacturer.

Removing the brake chamber

- Unscrew the air connection (A) from the brake chamber. Ensure that the air line of the brake chamber is depressurized.
- Unscrew the brake chamber nuts (B), see chapter 7.1.2 Tightening torques, page 60 => Position VII.

Installing the brake chamber

With the brake chamber in its installed position ensure that the lower drainage hole facing the ground is open. Depending upon brake chamber type and according the brake chamber manufacturer instructions, the other holes can be either openly, or must be plugged.

- Clean the sealing area (A) and the flange surface (B) on the brake caliper. Ensure that no dirt or moisture enters into the brake when cleaning.
- Grease the cavity of the brake lever (C).
– Place the brake chamber onto the brake caliper and manually screw on the brake chamber using new fastening nuts until the brake chamber makes full contact with the brake caliper.
   Always use new fastening nuts when fitting the brake chamber.
   Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake chamber facing the ground is open.
   Depending on the brake chamber type, the other drainage openings can either remain open or they must be sealed with a plug.

– Screw the air connection (A) onto the brake chamber, see first figure in this chapter.
   Observe the respective instructions of the brake chamber manufacturer here.
   Ensure that the brake hose is not twisted and routed so that it does not rub against the other parts.
   Ensure that the brake hose does not exert initial stress on the sliding function of the brake caliper and does not obstruct brake caliper movement over the entire displacement path.
– Check the air connection for tightness.
– Having completed the work, test the brake on a roller test stand.
6.3 Replacing the brake

Do not use power-driven tools.
While working on the brake or moving the brake caliper, handle the caliper only from outside to avoid injury.
Never use the pad hold down bracket as a grab handle or for fastening the brake to a lifting device, because the pad hold down bracket can be damaged in the process.
New brakes come as a complete assembly to be attached to the axle.
Make sure the brakes are mounted onto the correct side on the vehicle in forward direction (left hand brake / vehicle left side; right hand brake / vehicle right side).
Check the brake pads’ thickness for wear, see chapter 5.4 "Checking the brake discs", page 24. Should new pads be required, then all pads on the axle must be replaced.
The new brake without brake pad is supplied as a pre-assembled unit and may be mounted to the vehicle’s axle via the brake carrier.
The brakes are not interchangeable when they are installed on the axle. An arrow on the brake caliper indicates the brake disc's direction of rotation during forward driving.
Note the different versions of the brake on the front and rear axles.

Removing the brake

- Remove the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Remove the brake chamber from the brake caliper, see chapter 6.2 "Replacing the brake chamber", page 32.
- Remove the brake pads, see chapter 5.3 "Checking and removing brake pads", page 18.
- Loosen the fastening bolts (see following figure) and remove the brake caliper with the brake carrier from the axle, see chapter 7.1.2 Tightening torques, page 60 => Position III.
Prior to brake assembly inspect the torque plate radial mounting surfaces. Remove any loose debris, rust or oil which may be present.

Check the brake disc, see chapter 5.4 "Checking the brake discs", page 24.

Installing the brake

When fitting the brake follow the mounting instructions of the vehicle manufacturer, and make sure you do not mismatch the right and left brake.

Remove all transport locks from the new brake. The protection film (see white arrow in following figure) or the transport cap must be fully removed from the brake caliper in the area of the chamber fastening.

Place the new brake with brake carrier on top of the brake disc and mount the brake to the axle.

Tighten the bolts, see chapter 7.1.2 Tightening torques, page 60 => Position III.

Always note relevant specifications of the axle or vehicle manufacturer on bolt sizes, tightening torques and tightening sequence during this procedure and strictly adhere to them.

Install spreader plate and brake pads.

Adjust the clearance, see chapter 5.5 "Checking the bearing play of the guide pin", page 26.

Inspect the brake chamber for damage, particularly at the inner area of the piston-rod seal.

Replace the brake chamber if you have identified damage, see chapter 6.2 "Replacing the brake chamber", page 32.

Never fit a defective brake chamber again.

Clean the sealing surface and the flange area of the brake chamber.

Mount the brake chamber on the brake caliper, see page 32.
Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake chamber facing the ground is open.
Depending on the brake chamber type, the other drainage openings can either remain open or they must be sealed with a plug.
Observe the respective instructions of the brake chamber manufacturer.
– Check whether the wheel hub moves freely.

– Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.
– Having completed the work, test the brake on a roller test stand.
6.4 Replacing the seals

Do not use power-driven tools.
While working on the brake or moving of the brake caliper handle the brake caliper only from outside to avoid injury.
Never attach a lifting device to the pad hold down bracket as the bracket could be damaged.
Never use the pad hold down bracket (38) as a grab handle or for fastening the brake to a lifting device, because the hold down bracket can be damaged in the process.

If all seals of the brake caliper are replaced, the work sequences for replace the caps and bushings for guide pins, as well as the cap of the adjuster screw can be performed together.
If the seals were individually replaced however, the step sequences are to be performed individually as described in the following chapters.

6.4.1 Replacing the caps and bushings for the guide pins

Disassembly

– Remove the wheel in accordance with the instructions of the axle or vehicle manufacturer.
– Remove the brake chamber from the brake caliper, see page 32.
– Remove the brake pads, see chapter 5.3 "Checking and removing brake pads", page 18.
– Use a suitable fastening device (e.g. a vice) to clamp the brake to the brake carrier.
During the repair of the guide pins, the brake carrier must be firmly mounted, e.g. vice.

– Remove the cap (14) of the guide pins (10, 11) from the brake caliper (1). When removing the caps, apply the respective tool (such as a chisel) only to the closing cover and do not damage the holes of the closing cover on the brake caliper.

– Remove the socket head screws (12, 13), see chapter 7.1.2 Tightening torques, page 60 => Position IV.
– Remove the brake caliper (1) from the brake carrier (2).
– Clean the contact areas (fitting collars) to the guide pins on the brake carrier (2).
– Remove the guide pins (10, 11) from the brake caliper (1).

– Place the brake caliper (1) on a firm base for pressing out the bushings (8). The back of the brake caliper must face upwards.

– Use tools 10, 11 and 21 to press guide pin bushings (8) out of the brake caliper (1).

– Clean the bores in the brake caliper.
Assembly

– Press in two new bushings for the long guide pin.
– First, fit the bushing for the inner guide pin with tools 10, 11 and 29 by pressing in as far as the tool abutment.

– Second, fit the bushing for the outer guide pin with tools 10, 11 and 22 by pressing in as far as the tool abutment.
– Grease the sliding surfaces of bushing and the space between them.

– Press in one new bushing for the shorter guide pin with tools 10, 11 and 26 by pressing in as far as the tool abutment.
– Grease the sliding surface of the bushing.

– Clean the sealing seats (ring groove) of the brake caliper for the caps. The cleaned sealing seats must be clean and free from grease.
- Manually push new green caps (5) into the sealing seats (ring groove, see white arrow in following figure) of the brake caliper (1).

⚠️ Make sure that the caps (5) have a flush and wrinkle-free seat in the seal of the brake caliper (1).
– Grease the sliding surfaces of the guide pins (10, 11) and the edge of the seals (5).
– Insert a new long guide pin (10, 11) into the brake caliper from the brake chamber side.

The long guide bolt (10) is the fitting bolt and the short guide bolt (11) is the slider bolt.

Note the differences in the brake versions. The positions of the guide bolts (10, 11) depend on the brake design and installation position.

This way, the fitting bolts (10) are on the entry side and on the exit side of the brake disc. The slider bolts (11) are then found on the opposite side.

– Push the caps (5) over the guide pins (10, 11).
– Position the edge of the seal (5) into the ring groove of the guide pins (10, 11).

Make sure that the metal ring (see following figure) does not come off the cap in the process.

Ensure that the edge of the seals (5) have a flush and wrinkle-free in the ring groove of the guide pins (10, 11).
– Remove any excess grease.
The plane surfaces of the guide pins to the brake carrier and the contact areas of the brake carrier must be clean and free of grease.

– Slide the guide pins as far as from the brake caliper towards carrier (see first arrow in following figure), until the front fold of the seal points away from the front guide pin side (see second arrow in following figure).

**CAUTION**
Risk of damaging the seal
– When installing the brake carrier avoid the contact between the front of the seal and the brake carrier (see following figure).
- Place the brake caliper (1) on the brake carrier (2) and the inserted guide pins (10, 11) into the fitting collar.
- Observe the position of the seal.

- Insert two new screws (12, 13) through the guide pins inserted in the brake caliper (1).
  Use the long screw (12) for the long guide pin (10) and the short screw (13) for the short guide pin (11).
– Install the socket head screws (12) to the brake carrier (2) with torque wrench, see chapter 7.1.2 Tightening torques, page 60 => Position IV.

– Thread the bolts into the brake carrier (2), see chapter 7.1.2 Tightening torques, page 60 => Position IV.

During assembly, ensure that the caps (5) are not damaged or twisted while tightening the screws (12, 13).

Always tighten the long guide pin (10) with press-fit first and then the short guide pin (11) with sufficient clearance.

If the guide pins (10, 11) are released from the brake carrier (2) during the maintenance work, new screws (12, 13) must be used for reassembly.

– Manually move the brake caliper on the guide pins (10, 11) across the entire travel path and check for ease of movement; repeat the action a number of times.

⚠️ Do not squeeze the guide pin caps against the brake carrier while moving the brake caliper.
– Grease the bores for the cap (14) in the brake caliper (1).
– Push the brake caliper (1) against the brake carrier.
– Insert two new caps (14) into the bores of the brake caliper (1).
– Use tools 10, 11 and 27 to press the cap (14) down to the stop position.

Avoid damaging the caps while pressing them in.

– Prior to assembly, inspect the torque plate (axle) and brake carrier mounting surfaces.
– Remove any loosen debris, rust or oil which may be present.
– Mount brake over the disc on the axle, see chapter 6.3 "Replacing the brake", page 34.
– Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.
– Install brake pads and set clearance, see chapter 6.1 "Replacing the brake pads", page 28.
– Before installing the brake chamber clean the mounting surface and the mounting flange on the brake caliper and grease the concave seat (see white arrow in following figure) in the brake lever.

When cleaning be careful to ensure, that dirt or water does not enter in the brake.
Defective brake chamber

A defective brake chamber may not be used again. Particularly the internal piston rod sealing area must be checked for damage.
– Check the brake chamber for damage before mounting.

– Clean the mounting surface area of the brake chamber flange.
– Install the brake chamber, see chapter 6.2 "Replacing the brake chamber", page 32.
  With the brake chamber in its installed position, ensure that the lower drainage hole facing the ground is open.
  Depending upon brake chamber type and according the brake chamber manufacturer instructions, the other holes can be either openly, or must be plugged.
– Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer.

6.4.2 Install the cap of the adjuster screw

If the caps are removed individually, brake caliper and brake chamber need not be dismantled.

Removing the cap

– Remove the brake pads and the spreader plate, see chapter 6.1 "Replacing the brake pads", page 28.
– Push the brake caliper completely to the brake chamber side by hand.
– Pull the cap (6) from the ring groove of the adjuster screw (21).
– Remove the cap (6) from the ring groove of the brake caliper with a screwdriver. This is done by positioning the screwdriver between the cap and the brake caliper (see following figure). Make sure you do not damage the sealing seat of the cap in the brake caliper in the process.

Check the brake caliper.
Replace the brake if dirt or moisture has infiltrated the brake or if the sealing surface in the brake caliper, see chapter 6.3 "Replacing the brake", page 34.
– Check the adjuster screw thread.
– Push the brake caliper toward the brake chamber side until it reaches the stop.
– Turn the adjuster screw (21) counter clockwise about 1.18 in (30 mm) out of the brake caliper by hand.
– While threading it out, check the thread of the adjuster screw (21) for corrosion and damage.
Replace the brake if the thread and/or visible internal brake parts are damaged or corroded, see chapter 6.3 "Replacing the brake", page 34.
Replace the cap (6) if dirt or water has penetrated into the brake caliper through the seal surface or if the cap has been damaged during maintenance work.

– Make sure that the seal is correctly seated in the ring groove of the brake caliper.
Press the seal back into the ring groove by hand if necessary.
– Clean grooves of the seal (6) in the brake caliper / cover and in the groove of the adjuster screw (21) (see following figure).
Do not use any sharp edged tools or metal brushes for cleaning.
Ensure that no dirt or moisture enters the brake when cleaning.
The sealing seat for cap (10) in the brake caliper must be clean and free from grease

– Grease the thread of the adjuster screw (21).
– Turn the adjuster screw (21) clockwise back into the brake caliper again.
The adjuster screw pin must be in the same position as it was before it was screwed out.
Fitting the cap

- Slide a new and grease-free cap (6) over the adjuster screw (21).

- Center the cap (6) and press it into the ring groove of the brake caliper (1) by hand.
- Insert the edge (see white arrow in following figure) of the cap (10) into the ring groove of the adjuster screw (21).

- Ensure that the cap is fully seated in the brake caliper (1) and that the edge of the cap (6) has a flush and wrinkle-free seat in the ring groove of the adjuster screw (21).
– Install the spreader plate and the brake pads and set the clearance, see chapter 6.1 “Replacing the brake pads”, page 28.

– Having completed the work, test the brake on a roller test stand.
6.5 Replacing the adjuster

- Observe all safety instructions to avoid personal injury or material loss, see chapter 3 "Safety Instructions", page 8. These instructions must be observed to avoid personal injury or material loss.

Depending on the installation position and the accessibility of the brake on the vehicle, the brake will have to be removed to replace the adjuster.
If access to the brake is not hindered, removing the brake caliper is not necessary. The brake chamber still has to be removed.

Removing the adjuster

- Remove the wheel in accordance with the instructions of the axle or vehicle manufacturer.
- Remove the brake chamber from the brake caliper, see chapter 6.2 "Replacing the brake chamber", page 32.
- Remove the brake pads and the spreader plate, see chapter 6.1 "Replacing the brake pads", page 28.

- Loosen the fastening bolts and remove the brake caliper with the brake carrier from the axle, see chapter 7.1.2 Tightening torques, page 60 => Position III.
- Use a suitable fastening device (e.g. a vice) to clamp the brake to the brake carrier.

Replacing the sleeve (30c) of the adjuster (30) is only to be done using tools 10, 19 and 20.
– Screw the front part of tool 19 in the sleeve.
– Use tool 20 to tap in the direction of the white arrows (see following figure) and pull the sleeve out of the brake caliper.

Tool 20 seats loosely on tool 10 and is removable.

– Remove the shaft (30a) and the adjuster gear (30b) from the brake caliper.

– Clean the opening of the adjuster in the brake caliper.

The seat for the adjuster (30) in the brake caliper must be clean and free from grease.
Ensure that no dirt or moisture enters the brake when cleaning.

– Grease the seat (see white arrow in following figure) of the shaft (30a) in the brake caliper.
Installing the adjuster

The adjuster (30) consists of three parts: Shaft (30a), adjusting gear (30b) and sleeve (30c) with seal. The installation is done in three steps.

- Grease the shaft (30a) at the lower end (see white arrow in following figure) and position the shaft in the opening in the brake caliper.

- Make sure that the shaft (30a) is centered in the opening of the brake caliper (1).

Fitting the adjuster gear

- Grease the adjusting gear (30b) on the gear and the inner face (see white arrows in following figure).
- Push the adjuster gear (30b) over the shaft (30a) and position it centered in the opening of the brake caliper.
Make sure that the two gears interlock (circle).

Installing the sleeve

Grease the sleeve (30c) lightly only on the inner sealing lip (see white arrow in following figure).

Place the sleeve (30c) in the opening of the brake caliper so that the seal (see white arrow in following figure) of the sleeve is on the opening of the brake caliper.
– Center the sleeve (30c) on the opening in the brake caliper and press the sleeve lightly into the opening so that the seal opening of the sleeve (30c) is centered around the hexagon head of the shaft (30a).

– Position the small collar of the tool 20 on the edge of the sleeve (30c) and center the tool 20 on the sleeve (see white arrows in following figure).

– Use tool 20 to tap the sleeve completely into the seat of the brake caliper.
– Remove tool 20 from the sleeve (30c).
– Make sure that the seal of the sleeve (30c) is completely seated in the ring groove (see white arrows in following figure) of the shaft (30a).

![Image of shaft and seal](image1)

– Place the brake with the brake carrier over the brake disc, mount the brake on the axle and tighten the bolts, see chapter 7.1.2 Tightening torques, page 60 => Position III.

Always note the relevant specifications of the axle or vehicle manufacturer during this procedure and strictly adhere to them.

– Install spreader plate and brake pads and adjust the clearance, see chapter 6.1 "Replacing the brake pads", page 28.
– Push a new sealing plug (31) into the opening of the brake caliper. Make sure that the plug has a tight seat.

![Image of brake caliper and sealing plug](image2)

– Mount the brake chamber on the brake caliper, see chapter 6.2 "Replacing the brake chamber", page 32.
– Check that the wheel hub moves freely.
– Mount the wheel in accordance with the instructions of the axle or vehicle manufacturer
– Having completed the work, test the brake on a roller test stand.
7 Appendix

7.1 Workshop instructions

7.1.1 WABCO tool sets

Basic tool set – WABCO number 640 195 522 2
The basic tool set is necessary for all WABCO air disc brakes.

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Term</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Grip / Pin</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Adapter part</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Ring Spanner / Ratchet</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Extension</td>
<td></td>
</tr>
</tbody>
</table>

MAXXUS 22 tool set – WABCO number 640 322 522 2

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Term</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Tool brake adjuster</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Tool brake adjuster</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Extrusion mandrel</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Insert mandrel long-1</td>
<td></td>
</tr>
<tr>
<td>23*)</td>
<td>Insert mandrel long-2</td>
<td></td>
</tr>
<tr>
<td>24*)</td>
<td>Insert mandrel short</td>
<td></td>
</tr>
<tr>
<td>Nr.</td>
<td>Term</td>
<td>Tool</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>25*)</td>
<td>Insert mandrel long-2</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Insert mandrel short</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Insert mandrel for closing covers</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Insert mandrel long-2</td>
<td></td>
</tr>
</tbody>
</table>

*) These tools as components of the tool set are not needed for MAXXUS 22 brake service procedures.

### 7.1.2 Tightening torques

<table>
<thead>
<tr>
<th>Position</th>
<th>Term</th>
<th>Wrench size</th>
<th>Hexagon</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Hexagon ball head / manual brake adjuster</td>
<td>8 [SW]</td>
<td>X</td>
<td>22.12 / 30 + 11.06 / 15 Turning direction of hexagon: Turn clockwise respectively + on brake caliper. Air gap decrease. Max. 11.06 / 15. Turn counterclockwise respectively - on brake caliper. Air gap increase. Max. 11.06 / 15. Do not use power-driven tools.</td>
</tr>
<tr>
<td>II</td>
<td>Socket head screw / Pad hold down bracket</td>
<td>8 [SW]</td>
<td>–</td>
<td>22.12 / 30 + 11.06 / 15</td>
</tr>
<tr>
<td>III</td>
<td>Brake mounting</td>
<td>17 [SW]</td>
<td>–</td>
<td>295 / 400 ±22.12 / 30 recommended. Please note the special assembly instructions of the axle / vehicle manufacturer.</td>
</tr>
<tr>
<td>IV</td>
<td>Guide pin mounting</td>
<td>14 [SW]</td>
<td>–</td>
<td>95.88 / 130 + additional 90° turn / 90° Tightening sequence for guide pins 1. Long guide pin 2. Short guide pin</td>
</tr>
<tr>
<td>V</td>
<td>Brake chamber mounting</td>
<td>24 [SW]</td>
<td>X</td>
<td>154.88 / 210 - 22.12 / 30 Only install original WABCO brake chamber. The attachment of the brake chamber to the disc brake is recommended as follows: Install the fastening nuts, hand-tighten until the brake chamber is snug. Tighten the fastening nuts; 88.5 / 120 Tighten the fastening nuts; 154.88 / 210 – 30 using a torque wrench. Do not re-use fastening nuts.</td>
</tr>
</tbody>
</table>
7.1.3 Repair kits / spare parts

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

<table>
<thead>
<tr>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Vehicle manufacturer part number</td>
</tr>
</tbody>
</table>

– Open INFORM at http://www.wabco-auto.com
– Enter the WABCO part number of the brake caliper.
– Click on Repair.

⚠️ For lubrication use only the tube of grease supplied with the brake repair kit.

🔍 For more information according WABCO repair kits and WABCO service documents visit INFORM at http://www.wabco-auto.com

7.1.4 Disposing of the brake components

Dispose of used and replaced parts in accordance with the national or local environmental protection regulations.
WABCO Vehicle Control Systems (NYSE: WBC) is a leading supplier of safety and control systems for commercial vehicles. For over 140 years, WABCO has pioneered breakthrough electronic, mechanical and mechatronic technologies for braking, stability, and transmission automation systems supplied to the world’s leading commercial truck, trailer, and bus manufacturers. WABCO is headquartered in Brussels, Belgium. For more information, visit http://www.wabco-auto.com