PAN 22-1

Assembly and Maintenance Instructions

WABCO

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Edition 3

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1 Important instructions and safety instructions

1.1 General Information

This publication describes maintenance and repair of the disc brakes PAN 22-1 including the individual operations and work processes required to replace components using available repair kits.

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

Before you begin with maintenance, repair, replacing a part etc., carefully read all the safety instructions as well as the repair and maintenance instructions included this publication. These instructions must be observed to avoid personal injury or material loss.

WABCO only guarantees the safety, reliability and performance of its products and systems if all instructions, notes and safety instructions are observed.

Before you perform any work on the vehicle (repair, maintenance, replacing parts, etc.), you must ensure the following:

Only trained and qualified personnel may perform repairs on the vehicle.

Always follow specifications and instructions of vehicle manufacturer.

Always comply with the Company and national accident prevention guidelines and Health and Safety regulations.

Wear any necessary protective clothing.

The workplace has to be dry, as well as sufficiently lit and ventilated.

1.2 Safety instructions

WARNING **Reduced braking effect or brake failure**

Danger of accidents

- Regularly check the wear limits of brake linings and brake discs.
- Replace worn, scorched, glazed, or oily brake linings immediately.
- Immediately replace worn or damaged brake discs.
- Always replace all brake linings and brake discs on an axle.

WARNING **Rolling vehicle**

Danger of accidents

- Position the vehicle on an even surface and secure it against rolling away with brake wedges.
- Only use approved devices to jack up and secure the vehicle.
- Ensure that the gearbox is in neutral and that the hand brake is applied.

CAUTION **Risk of injury due to hazardous dusts**

- Do not clean any soiled areas of the brake with compressed air or other high-pressure devices.

CAUTION **Risk of injury due to heavy load**

- A second technician must assist during removal and installation of the brake.

CAUTION **Risk of injury due to brake action while working on the brake**

- Attach a clearly marked note on the steering wheel saying that work is being performed on the vehicle and that the brake must not be touched.

CAUTION **Risk of injury: Crushing of fingers**

– Only grip the brake on the outside with your hands while moving the brake calliper or working on the brake.

– Do not use motor-driven screw tools.

CAUTION **Risk of injury due to falling brake parts**

– Use suitable equipment, such as a vice, to clamp the brake when performing repairs on the brake outside the vehicle.

1.3 Repair and maintenance instructions

For good handling and braking characteristics it is essential that the disc brake be in flawless technical condition.

– If cast parts have been heavily damaged or are severely worn, (cracks for example), replace the entire brake following the instructions.

– Do not open the clamping unit on the brake calliper, and do not unscrew the fastening screws on the clamping unit cover.

– Do not apply the brake when brake linings have been removed.

– 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.

– Only use original WABCO parts and approved brake linings. An exploded view of replacement parts is found in the annex of this document (see chapter 8.2 "Exploded view of the replacement parts", page *33*).

– Only use grease contained in the repair kits.

– Perform the repair work using only the recommended tools. Do not use motor-driven screw tools. Tighten screws and nuts only with the specified spanners, applying only the specified tightening torque; refer to the table in Annex (see chapter 8.1 "Widths A/F and tightening torques", page *31*) for the corresponding positions.

– Perform a concluding roller test stand test having completed the repairs. If no roller test stand is available, conduct a test drive with brake action tests.

– Do not perform full braking, with the exception of emergency braking, during the first 50 km after new brake linings have been fitted. Also avoid continuous braking over longer periods. Ensure that the driver of the vehicle is informed.

1.4 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 to severe injury, or material loss, if the safety instruction is not observed.

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

• List

– Step

2 Description of the mechanical sliding calliper disc brake

The brake PAN 22-1 is a one-piston-brake. The brake is supposed to be used in commercial vehicles and trailers on front and rear axles for 22.5" wheel rims as service, auxiliary and parking brake. It is actuated mechanically via a diaphragm brake cylinder or a spring brake actuator. The latter is fitted directly onto the brake calliper, thereby reducing the overall axial length of the brake. This enables optimal utilisation of the installation situations.

The entire disc brake consists of brake cylinder, brake calliper (1), and brake anchor plate (2).

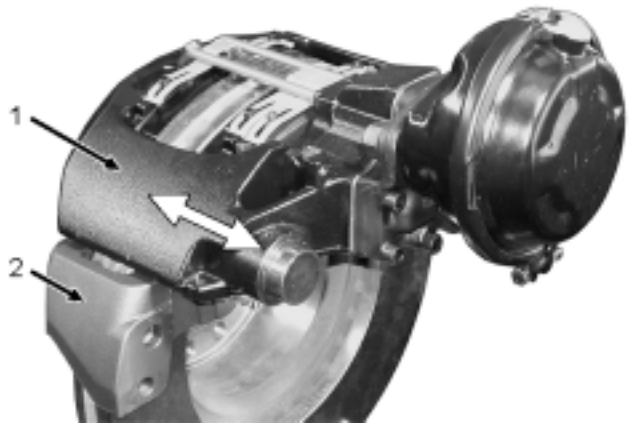


fig. 2-1: Entire disc brake

1 Brake calliper
2 Brake anchor plate
Arrow Direction of movement of the brake caliper

Functional description

More information is provided in the illustrations below.

Axial movement of the brake calliper (1) occurs on the guide pins (8, 9) of the brake carrier (2). In the brake carrier the brake pads (35, 36) are guided and supported axially relocatable. The brake lining support is implemented by means of a retainer (38) and hold-down springs (37).

The radially open design of the brake calliper allows simple and quick changes of the brake pads. Brake pads with a large wear volume are used in order to prolong the pad replacement intervals with this brake.

For compensating the pad wear the actuating mechanism of the brake is equipped with an automatic adjuster mechanism. This mechanism maintains a preset clearance regardless of load and operating conditions. This, together with a stable and stiff construction of the brake calliper, results in a safe control of the pedal travel and increases the distance reserve for emergency braking.

The internal moving components are lubricated for life and all sealing components are maintenance free unless damaged.

Optionally the disc brake is equipped with an electrical wear indicator (threshold indicator).

When the indicators in the vehicle light up, the minimum lining thickness has been reached. It is necessary to drive the vehicle to a workshop for the brake linings to be replaced.

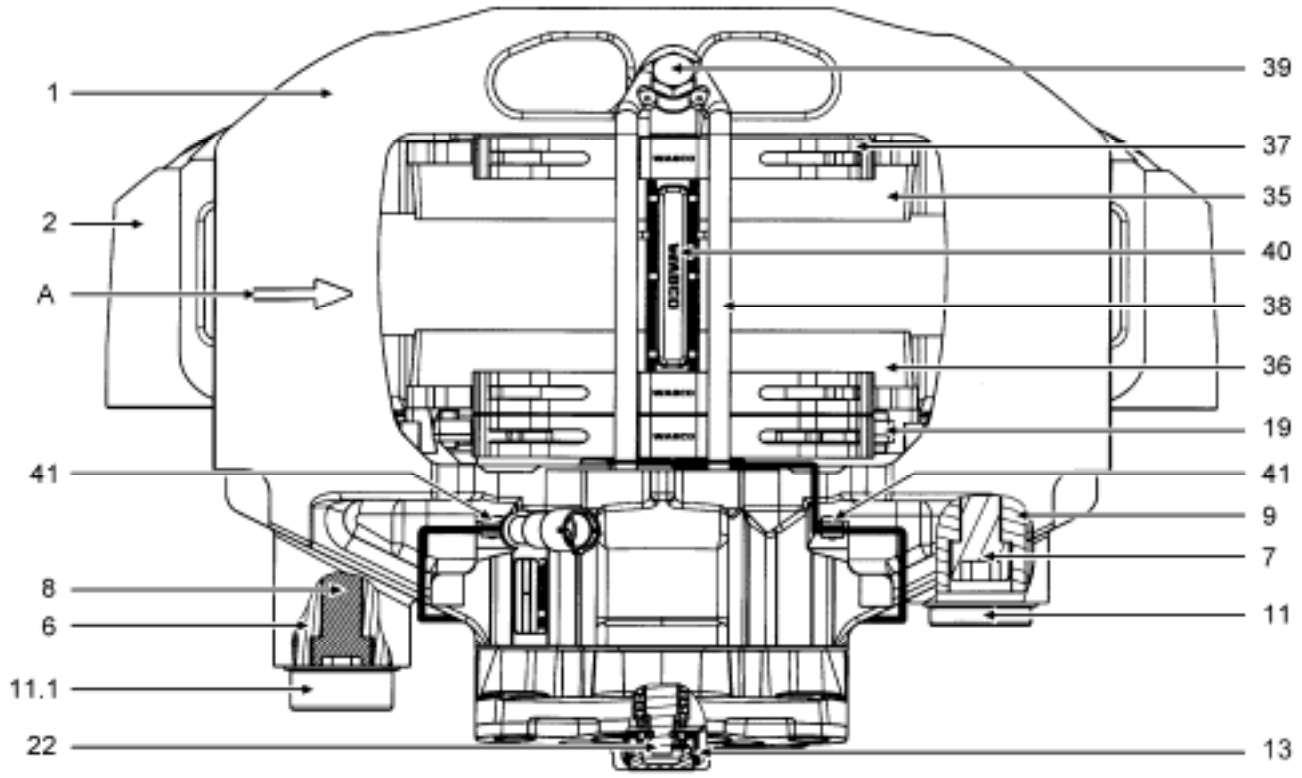


fig. 2-2: Top view and sectional view

1 Brake calliper
2 Brake anchor plate
6 Guide pin (long)
7 Internal hexagon bolt (short)
8 Internal hexagon bolt (long)
9 Guide pin (short)
11 Closing cover (short)
11.1 Closing cover (long)
13 Gaiter on hexagon nut of the adjuster
19 Pressure plate
22 Hexagon nut of the adjuster
35 Brake lining rim side
36 Brake lining cylinder side
37 Hold-down spring
38 Lining retainer
39 Hexagon screw
40 Cable guide with wear indicator
41 Holding clip
A Direction of rotation, driving forward

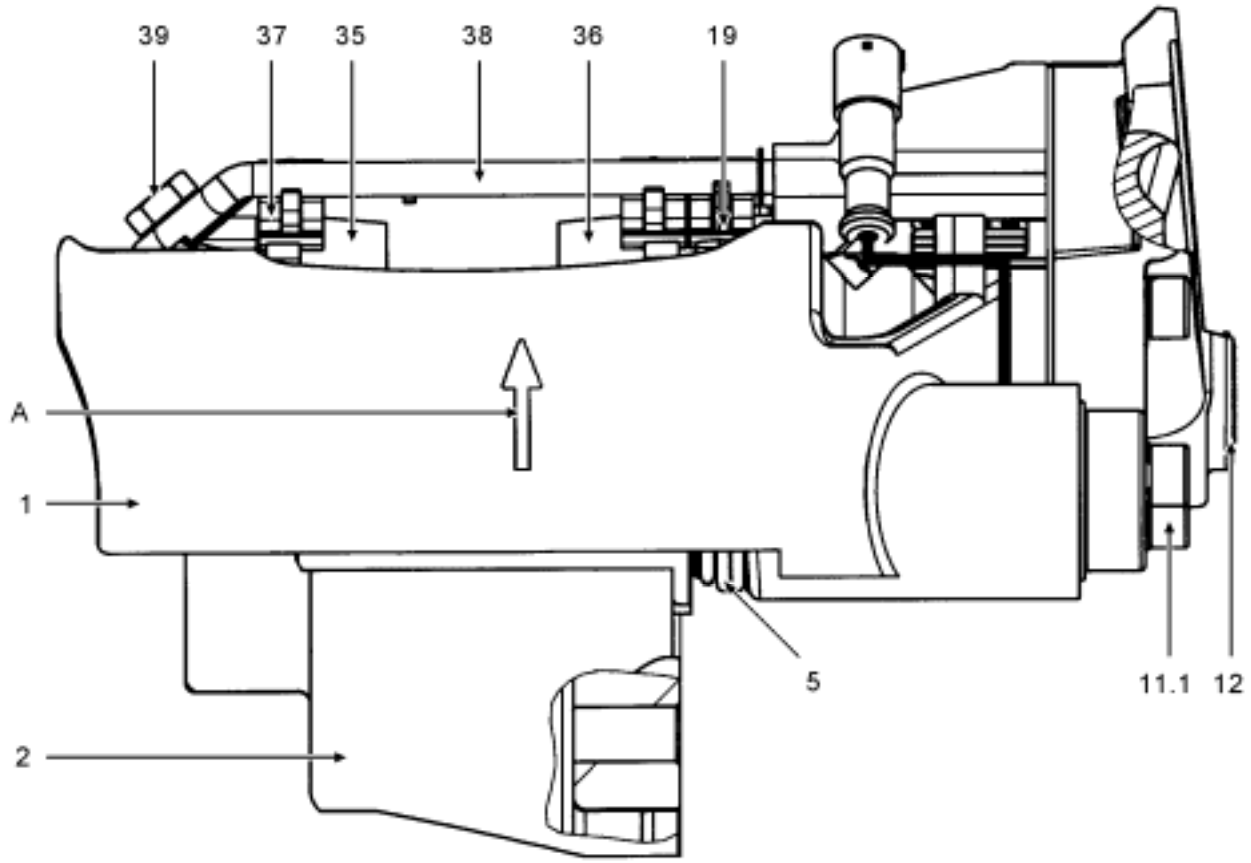


fig. 2-3: Page preview and sectional view

1 Brake calliper
2 Brake anchor plate
5 Protection caps for guide pins
11.1 Closing cover (long)
12 Sealing plug for adjustment
19 Pressure plate
35 Brake lining rim side
36 Brake lining cylinder side
37 Hold-down spring
38 Lining retainer
39 Hexagon screw
A Direction of rotation, driving forward

3 Service Instructions

CAUTION **Risk of injury**

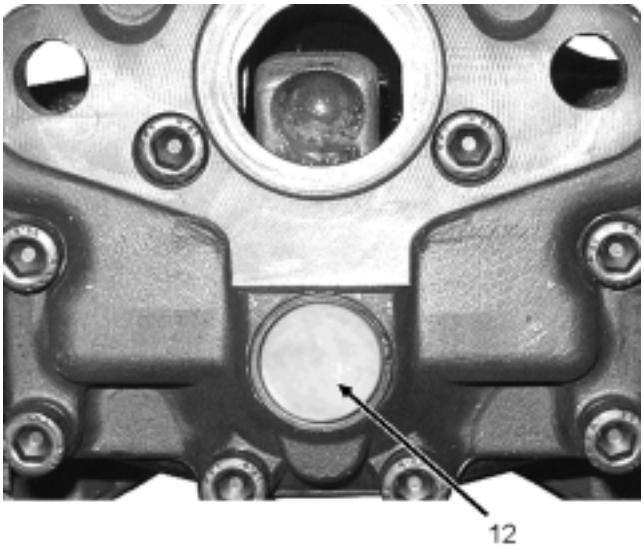
- Observe all safety instructions, as well as all repair and maintenance instructions (see chapter 1 "Important instructions and safety instructions", page *5*).
- These instructions must be observed to avoid personal injury or material loss.

3.1 Checking the brake

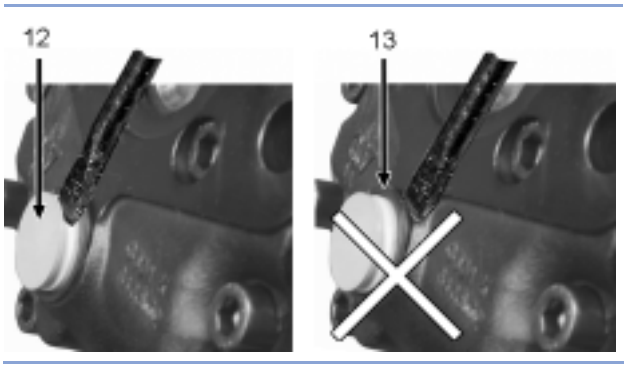
3.1.1 Checking the adjuster

Directions of rotation and torques of the hexagon nut of the adjuster are listed in the table in the annex (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item I).

– Remove the sealing plug (12) of the adjuster.



When removing the sealing plug, apply the respective tool (such as a screwdriver) only to the sealing plugs and do not damage the gaiter (13) of the adjuster or the Brake calliper.



– Check the gaiter (13) for wear and damage.
– Renew defect gaiter (13) of the adjuster (see chapter 6.3 "Renewing the gaiter on hexagon nut of the adjuster", page *27*).
– Use the ring spanner to turn hexagon (22) of the adjuster ½ turns clockwise (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item I)

There must be sufficient space for the engaged ring spanner; it must not be obstructed when it is turned during adjustment.

Do not use an open-end spanner for the hexagon (22) of the adjuster and never overstrain the hexagon nut. Otherwise the hexagon will be damaged.

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

The adjuster is functioning when the ring spanner turns anti-clockwise with every brake actuation.

With increasing adjustment the angle of rotation of the engaged ring spanner becomes smaller. The adjuster is working correctly if the ring spanner rotates anti-clockwise as described above.

Faults that might occur:

The engaged ring spanner

- does not
- rotate - only with the initial brake action
- rotates forward and backward with every brake action

In these cases the adjuster is faulty and the brake must be replaced (see chapter 5 "Renewing the brake", page *20*).

– Reset the clearance to 1 mm having completed the adjuster test (see chapter 4.3 "Fitting the brake linings", page *17*).

– Insert the sealing plug (12) into the adjuster and ensure that the plug has a tight seat.

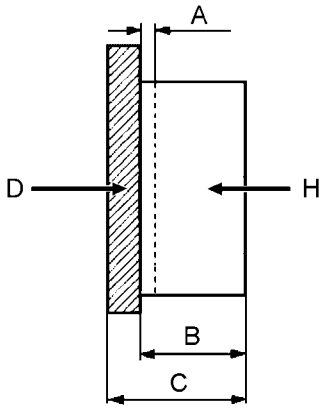
3.2 Inspection of the brake linings

The brake lining thickness must be checked at regular intervals, in relation to vehicle use, during maintenance intervals, as well as in the context of applicable local laws and regulations.

Burned, glazed or oil contaminated brake linings must be replaced immediately.

Always replace all brake linings on an axle.

To avoid damaging the brake disc replace the brake linings no later than at the point when they reach the wear limit at their weakest spot.

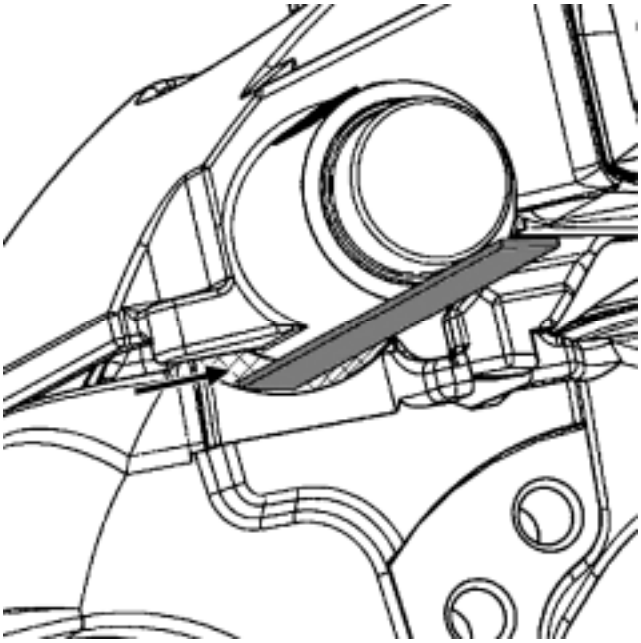


A Lining thickness worn without lining support (limit value 2 mm minimum lining thickness)
B Lining thickness new without lining support (23 mm)
C Overall thickness new lining with lining support (32 mm)
D Friction material
H Brake pad

Optical pad wear indication

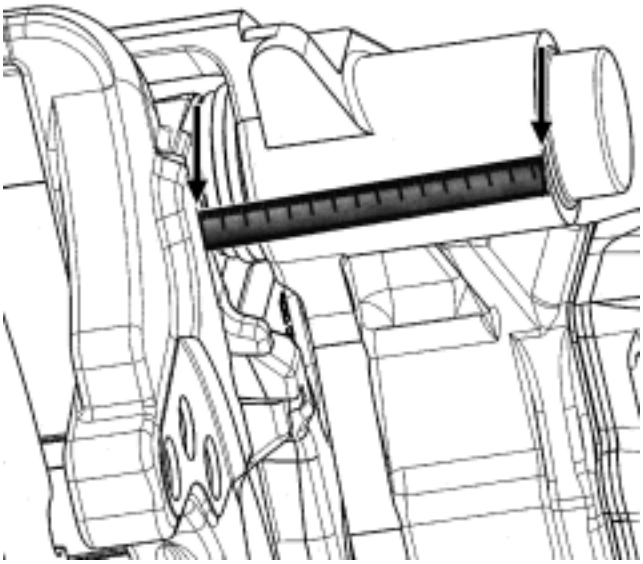
The medium brake pad wear can be measured with a tape measure or a ruler, depending on the access, either at the fitted pin (long guide pin at disc leading side) or at the non-fitted pin (short guide pin at the disc trailing side).

– Place ruler on the surface of the brake carrier. (hatched area in picture, arrow)



The measuring point on the brake carrier is the worked on area for screwing of the respective guide pin (arrow on hatched area).

– Measure the distance between brake carrier (left arrow) and the upper edge of the guide pin (right arrow) on the brake calliper.



If the measured distance

- on the short guide pin is greater than **94 mm**,
- on the long guide pin is greater than **120 mm**,

the maximum wear is reached.

– Replace the brake linings if the maximum wear is reached (see chapter 4 "Replacing the brake linings", page *14*).

3.3 Inspection of the brake discs

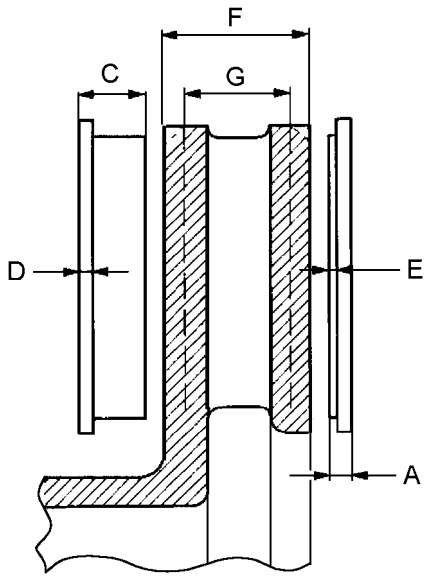
Regularly check the wear limits of brake linings and brake discs.

When brake linings and/or brake discs are worn, the braking effect is reduced and there is a risk of brake failure. Replace brake discs and brake linings.

Always replace all brake discs on an axle.

The brake discs must be cleaned and free of grease.

Having installed new brake discs, it is recommended that new brake linings be fitted as well.



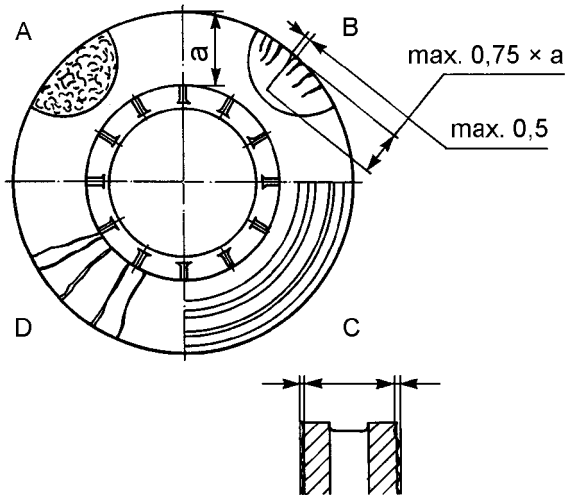
A Lining thickness with lining support (limit value 11 mm minimum lining thickness)
C Overall thickness new lining with lining support (32 mm)
D pad backplate thickness (9 mm)
E minimum pad thickness (2 mm)
F Overall thickness new brake disc (45 mm)
G Wear allowance limit (at least 37 mm)

– Remove the brake linings (see chapter 4.1 "Removal of the brake linings", page *14*).

– Measure the brake disc thickness at the contact area of the brake linings.

– Replace the brake disc if the wear measurement limit of 37 mm has been reached at the thinnest point.

Checking the condition of the brake disc



A network-type cracks: permissible
B radial cracks up to a max. 0.5 mm width: permissible
C Uneven disc surface up to max. 1.5 mm depth: permissible
D continuous cracks: not permissible
a Width of the braking area

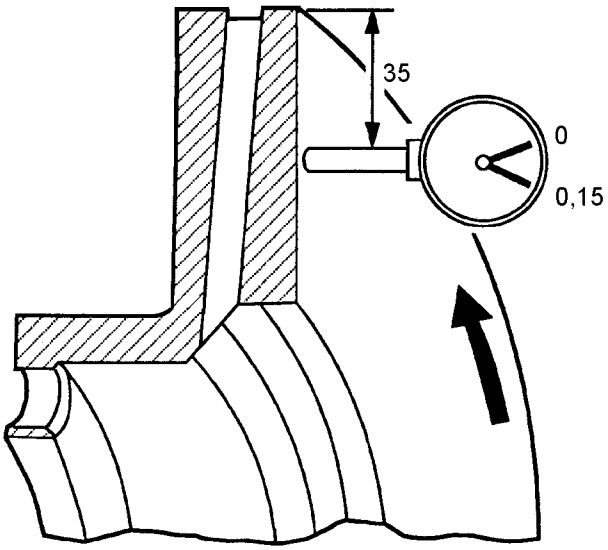
– Check the brake disc for cracks and the condition of the surface.

– Replace the brake disc if the brake disc has continuous cracks or unevenness or cracks reach the maximum dimension.

Checking the disc runout

– Fasten the dial indicator to the brake calliper.

– With the brake disc installed, check the disc runout by rotating the wheel hub. Limit value: 0.15 mm



– Replace the brake disc or rework it appropriately if the disc runout is greater than 0.15 mm.

– Install the brake linings, and adjust the clearance (see chapter 4.3 "Fitting the brake linings", page *17*).

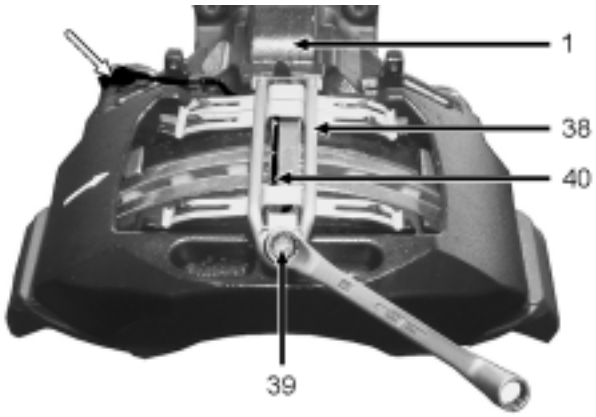
4 Replacing the brake linings

CAUTION **Risk of injury**

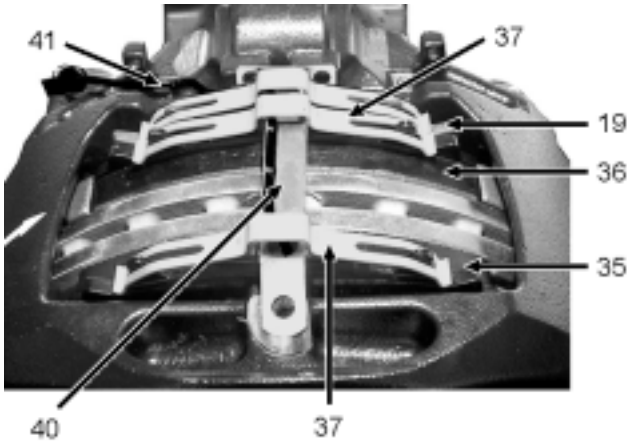
- Observe all safety instructions, as well as all repair and maintenance instructions (see chapter 1 "Important instructions and safety instructions", page *5*).
- These instructions must be observed to avoid personal injury or material loss.

4.1 Removal of the brake linings

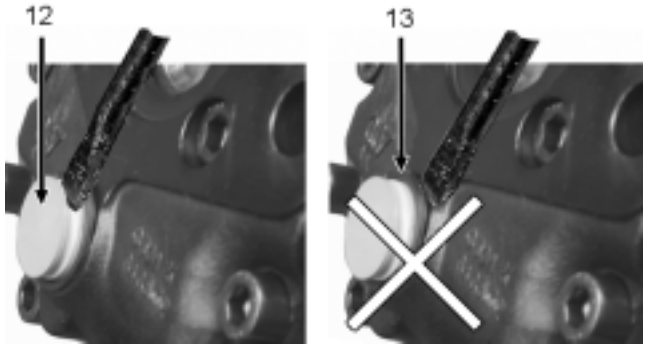
- Disconnect the plug connection (40) of the wear indicator. (40)
- Remove the hexagon head screw (39) from the lining retainer (38) (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item II).
- The lining retainer (38) has to be withdrawn from the calliper (1).



- Remove three hold-down springs (37) from the brake linings (35 and 36) and the pressure plate (19).
- Remove the cable guide (40) with the wear indicators.
- Remove the spring clips (41) from the calliper.
- Remove the sealing plug (12) of the adjuster from the calliper (1).



When removing the sealing plug, apply the respective tool (such as a screwdriver) only to the sealing plugs and do not damage the gaiter (13) of the adjuster or the Brake calliper.



- Check the gaiter (13) for wear and damage.
- Renew defect gaiter (13) of the adjuster (see chapter 6.3 "Renewing the gaiter on hexagon nut of the adjuster", page *27*).

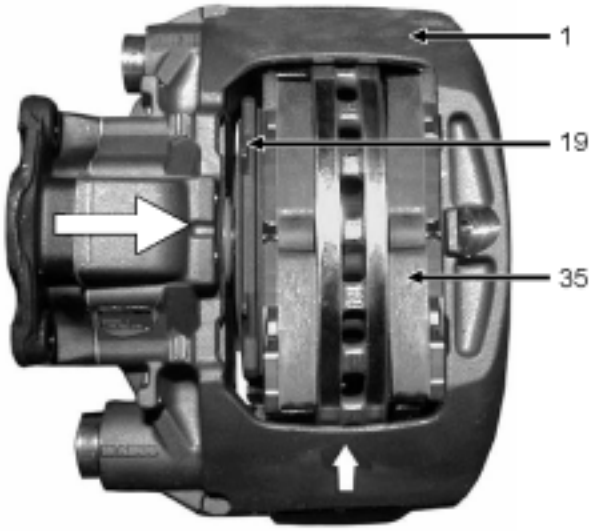
– Use a ring spanner to turn the hexagon (22) of the adjuster clockwise to the stop position and then turn the hexagon back in anticlockwise direction by 90°.

– While turning the hexagon (22), use your hand to push the pressure plate (19) towards the cylinder side to ensure that the pin as an antirotation element for the adjuster screw (21) does not slip out of the retaining groove of the pressure plate.

  Otherwise the adjuster screw could turn and so damage the protection cap (10).

– Push the calliper (1) towards the rim side (arrow) by hand.

– Remove the brake lining (35) on the rim side.



– Push the calliper (1) towards the cylinder side (arrow) by hand.

– Remove the brake lining (36) and pressure plate (19) on the cylinder side.

! Danger of bodily injury!

Do not apply the brake when brake linings have been removed.

– Use a wire brush to clean pressure plate, lining slot and pressure plate guide, and remove any corrosion on these components.

  Take care not to damage the protection caps (5, 10) while cleaning.

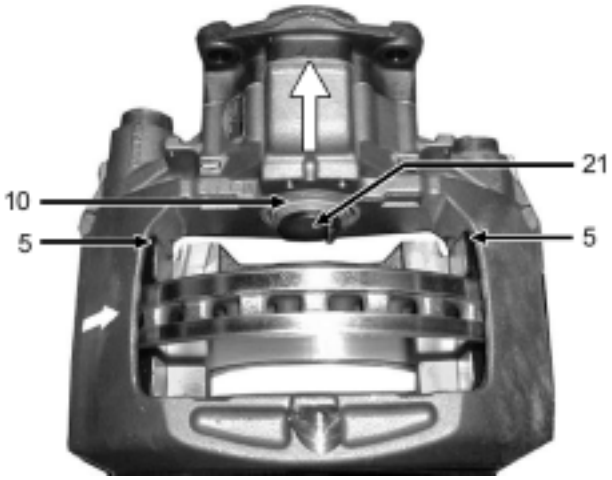
! The guide surfaces of the brake linings on the brake anchor plate must be free of grease!

4.2 Checking the protection caps and the ability of the brake calliper to move

– Push the calliper (1) towards the cylinder side by hand (arrow).

– Check the protection caps (5, 10) for the guide pins (8, 9) and the adjuster screw (21) for wear and damage.

– Renew any defective protection caps (see chapter 6.1 "Renewing the protection caps and the bushings of the guide pins", page *22* and see chapter 6.2 "Renewing the protection cap of the adjuster screw", page *25*).

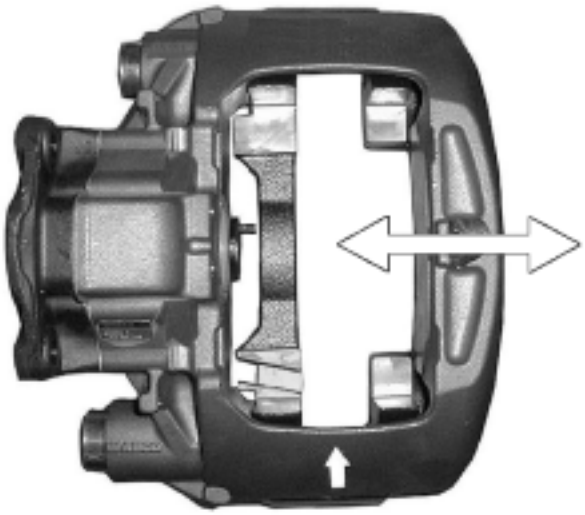


If a protection cap is damaged, check whether dirt or moisture has penetrated into the brake's interior parts or have damaged the calliper due to corrosion.

Renew the brake if you have identified damage or corrosion (see chapter 5 "Renewing the brake", page *20*).

Renew the protection caps if they are damaged during service work on the brake.

– Manually move the brake calliper on the guide pins across the entire displacement path and check for ease of movement.



Do not squeeze the guide pin protection caps against the brake anchor plate while moving the calliper.

– Replace the bushings and the protection caps if the calliper moves sluggishly (see chapter 6.1 "Renewing the protection caps and the bushings of the guide pins", page *22*).

– Check the adjuster.

Secure the adjuster screw (21) against twisting when performing the test and when turning the hexagon (22) by arresting the pin (arrow) of the adjuster screw.

– Use the ring spanner to turn hexagon (22) of the adjuster anticlockwise until the adjuster screw reaches the brake disc and check for ease of movement.

There must be sufficient space for the engaged ring spanner; it must not be obstructed when it is turned during adjustment.

Do not use an open-end spanner for the hexagon (22) of the adjuster and never overstrain the hexagon nut. Otherwise the hexagon will be damaged.

– Use the ring spanner to turn hexagon (22) clockwise back to the stop limit.

When returning the hexagon (22) clockwise, the torque is greater than the torque to turn anti-clockwise.

– Gently apply the brake 5 times (braking pressure approx. 1 bar). The adjuster is functioning when the ring spanner turns anti-clockwise with every brake actuation.

With increasing adjustment the angle of rotation of the engaged ring spanner becomes smaller. The adjuster is working correctly if the ring spanner rotates anti-clockwise as described above.

Faults that might occur:

The engaged ring spanner

- does not
- rotate - only with the initial brake action
- rotates forward and backward with every brake action

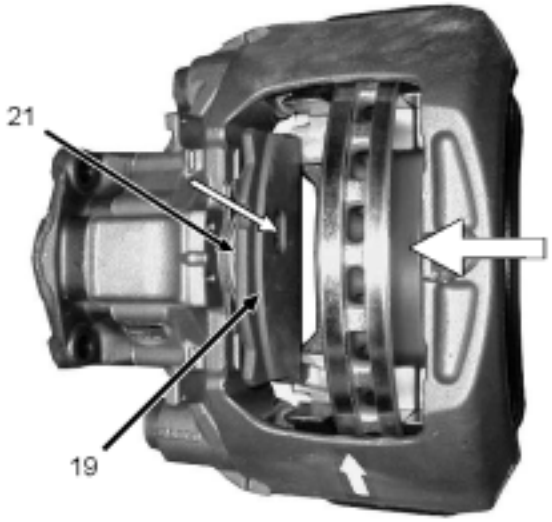
In these cases the adjuster is faulty and the brake must be replaced (see chapter 5 "Renewing the brake", page *20*).

– Check the brake discs (see chapter 3.3 "Inspection of the brake discs", page *12*).

4.3 Fitting the brake linings

– To insert the brake linings on the cylinder side, push the calliper towards the cylinder side until there is sufficient distance to the brake disc.

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

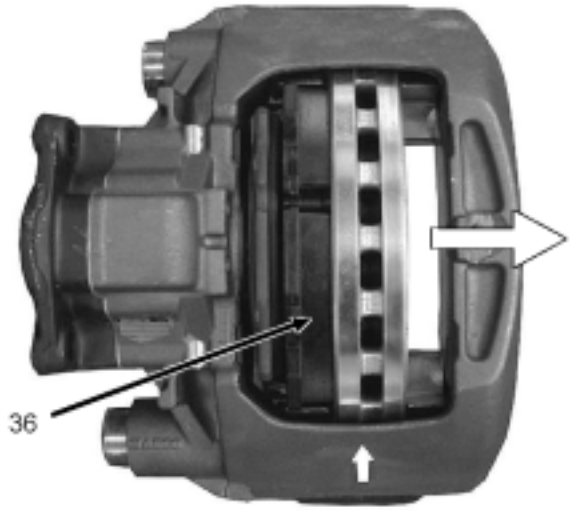


Ensure that the pressure plate is seated in the guide groove of the brake anchor plate and that it rests with the entire surface on the guide strips of the brake anchor plate. Otherwise the pressure plate could slide out of the guiding.

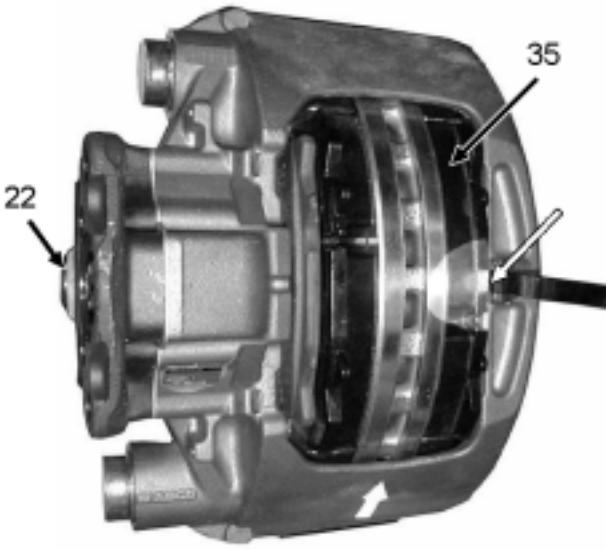
If required, push the calliper a little towards the rim side.

The pin of the adjuster screw must mesh with the groove (small arrow) of the pressure plate, otherwise the adjustment will not function correctly. Turn the adjuster screw until the pin meshes with the groove of the pressure plate. Ensure that the protection cap is not twisted.

– Fit a new brake lining (36) on the cylinder side.
– Push the calliper towards the rim side until the brake lining (36) of the cylinder side bears against the brake disc.

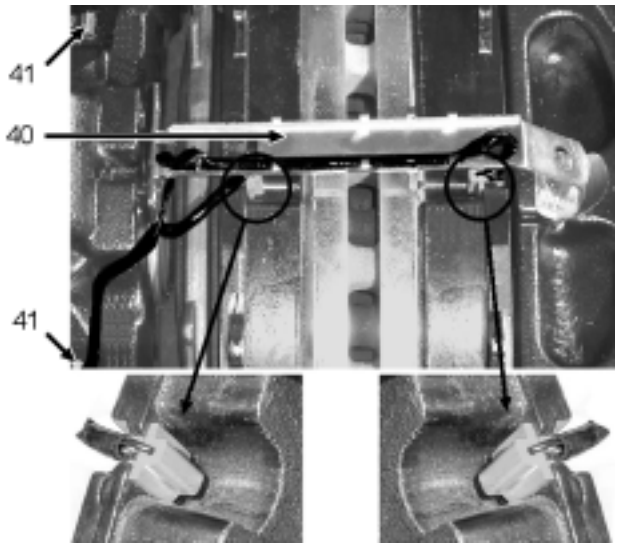


– Fit a new brake lining (35) on the rim side.
– Adjust the clearance by means of a 1 mm feeler gauge (arrow). For this purpose insert the feeler gauge between the brake lining of the rim side and the calliper. Turn the hexagon (22) of the adjuster anticlockwise with a ring spanner until both brake linings bear on the brake disc.



Always insert the feeler gauge into the centre between brake calliper (1) and brake lining support plate (35). Do not use an open spanner for the hexagon (22) of the adjuster. Otherwise the hexagon will be damaged.

– Fit two new spring clips (41) in the brake calliper.
– Place the cable guide (40) with preassembled wear indicators onto the brake calliper and insert the indicators (circle) into the brake linings.

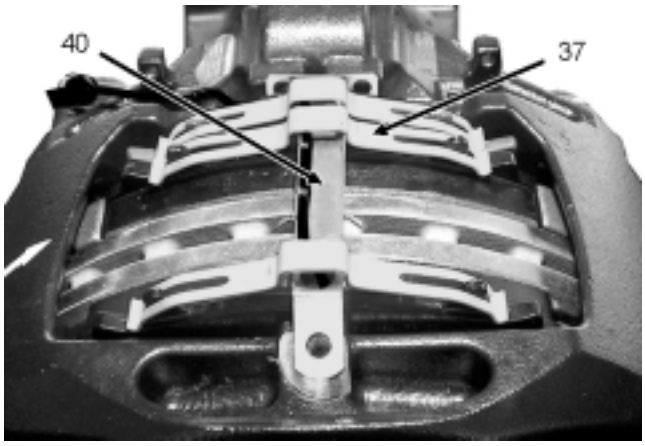


Ensure that each wear side of the indicators points towards the brake disc and that the indicators are inserted completely into the brake pad.

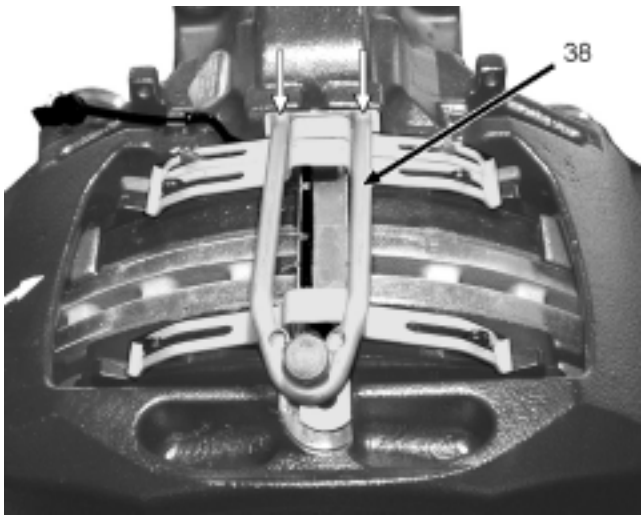
– Position the cable guide (40) and the cable outlet of the wear indicators onto the brake calliper.

When laying the cable, ensure that the cable does not touch the brake lining.

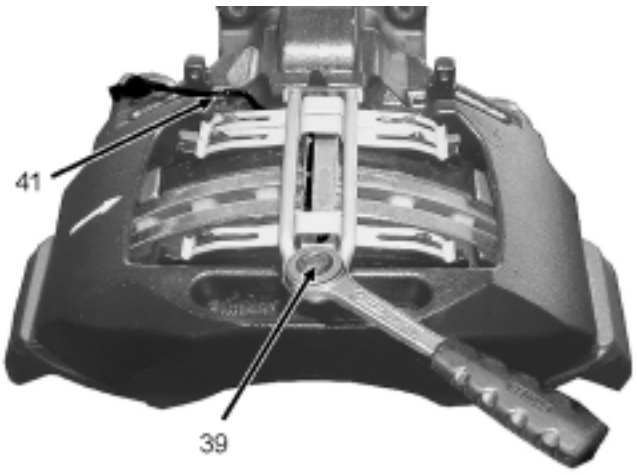
– Place the new hold-down springs (37) over the cable guide onto the brake linings (35, 36) and the pressure plate (19).



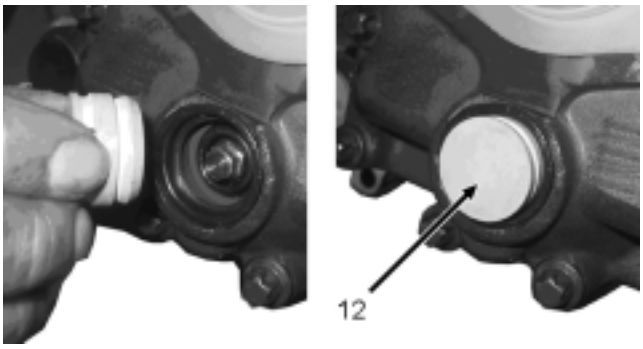
– Push the new lining retainers (38) through the openings in the cable guide into the openings (arrows) of the brake calliper.
– Press down the lining retainer so that the radial lugs of the hold-down springs mesh with the retainer.



– Fasten a new hexagon screw (39) to the brake calliper (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item II).
– Remove the transport protection cap if in place.
– Connect the wear indicator connector to the socket of the vehicle or the axle.
– Fasten the cable to the spring clip (41) of the brake calliper.



– Ensure that the cable has been laid correctly and fix the cable in position using cable ties.
– Push a new sealing plug (12) into the opening of the brake calliper. Ensure that the plug has a tight seat.



– Check the wheel hub for ease of movement.

! Having completed the work, test the brake on a roller test stand.

5 Renewing the brake

CAUTION **Risk of injury**

- Observe all safety instructions, as well as all repair and maintenance instructions (see chapter 1 "Important instructions and safety instructions", page *5*).
- These instructions must be observed to avoid personal injury or material loss.

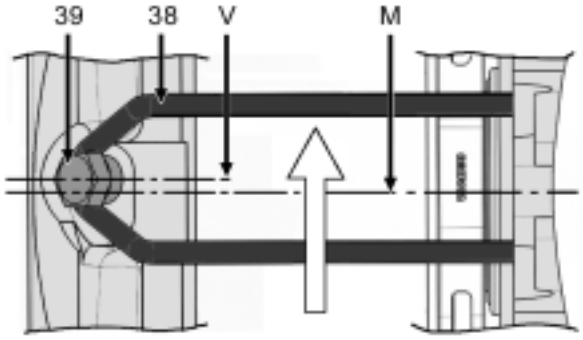


fig. 5-1: Left brake with the direction of rotation of the brake disc driving forward

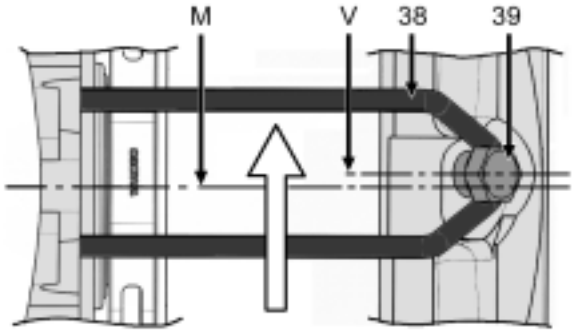


fig. 5-2: Left brake with the brake disc direction of rotation driving forward

38	Lining retainer
39	Hexagon screw
V	Axle offset relative to the brake centre in brake disc exit side direction
M	Brake centre (axle centre)
Arrow	Brake disc direction of rotation, brake disc exit side top

The new brake is supplied as a pre-assembled unit and may be mounted to the vehicle's axle via the brake carrier.

Left and right brake must not be interchanged when they are installed on the axle. The correct assignment of the brakes to left and right side of the axle can be determined by means of the brake's lining retainer (38) and hexagon screw (39) positions.

Use the following scheme: The retention aperture for the lining retainer (38) and the thread opening for the hexagon screw (39) in the calliper are always offset relative to the brake centre M (axle) by an axle offset V in the brake disc exit direction (brake disc direction of rotation driving forward).#

5.1 Removing the brake

The graphic representation of the brake carrier may differ from the actual design, so that the representation does only apply in principle.

- Remove the brake linings (see chapter 4.1 "Removal of the brake linings", page *14*).
- Remove the brake cylinder from the calliper (see page *29*).

- Disconnect the plug connection of the wear indicator.
- Remove the brake calliper with brake anchor plate from the axle (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item III).
- Check the brake disc (see chapter 3.3 "Inspection of the brake discs", page *12*).
- Check the dismantled brake linings and replace if necessary (see chapter 3.2 "Inspection of the brake linings", page *11*).

5.2 Installing the brake

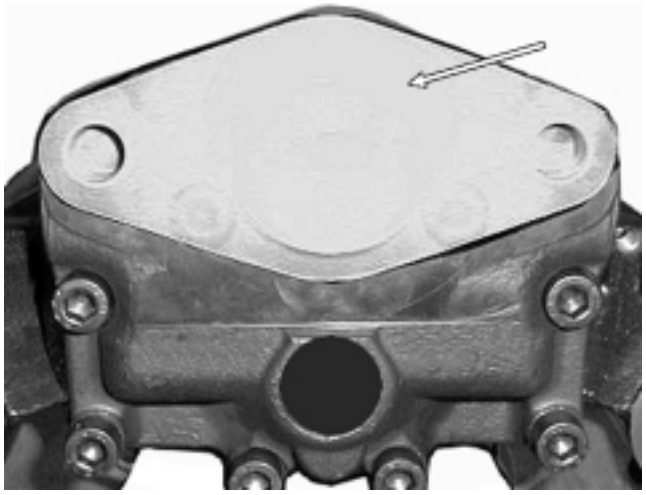
Observe the mounting instructions of the vehicle manufacturer when installing the brake.

– Remove the transport fastenings from the new brake calliper.

– Place the brake with brake anchor plate on top of the brake disc and mount the brake to the axle.

  Tighten the hexagon screw (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item III).

– Remove the transport protection cap (arrow) from the brake calliper in the cylinder fastening area.



– Install pressure plate, brake linings, and wear indicators, and adjust the clearance (see chapter 4.3 "Fitting the brake linings", page *17*).

– Connect the wear indicator connector to the socket of the vehicle or the axle and fasten the cable to the hold-down clip (41) of the brake calliper.

– Ensure that the cable has been laid correctly and fix the cable in position using cable ties.

– Mount the brake cylinder on the calliper(see page *29*).

Depending on the installation position of the brake, ensure that the lower drainage aperture facing the ground is open! All other drainage apertures must be sealed by plugs.

6 Renewing the sealings

CAUTION **Risk of injury**

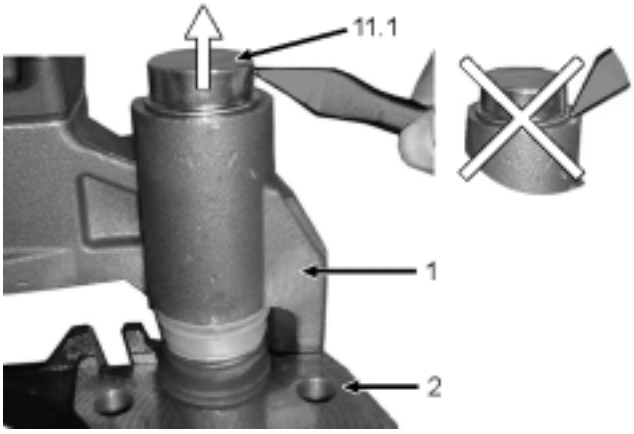
- Observe all safety instructions, as well as all repair and maintenance instructions (see chapter 1 "Important instructions and safety instructions", page *5*).
- These instructions must be observed to avoid personal injury or material loss.

When replacing all of the gaiters in the calliper, the work sequences for renewing the protection caps and the bushings of the guide pins as well as the protection cap of the adjuster screw can be executed combined.

6.1 Renewing the protection caps and the bushings of the guide pins

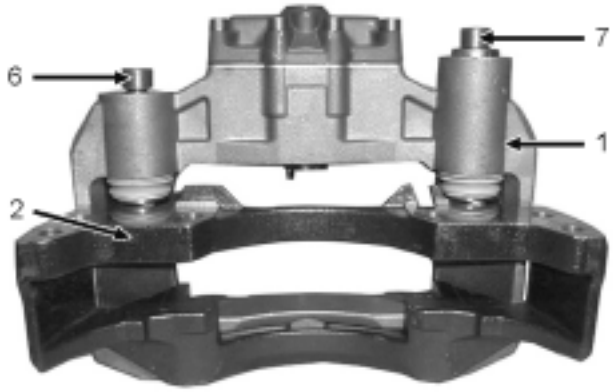
Disassembly

- Remove brake linings, the brake cylinder, the wear sensor, and the brake calliper with brake anchor plate from the axle (see chapter 5.1 "Removing the brake", page *20*).
- Remove the closing cover (11, 11.1) of the guide pins (8, 9) from the brake calliper (1).



When removing the sealing plug, apply the respective tool (such as a chisel) only to the closing cover and do not damage the seat of the closing cover on the brake calliper.

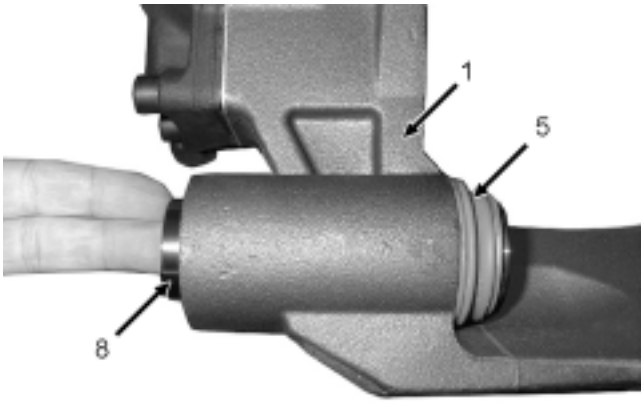
- Unscrew the screws (6, 7) (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item IV), and remove the brake calliper (1) from the brake anchor plate (2).



Danger of bodily injury!

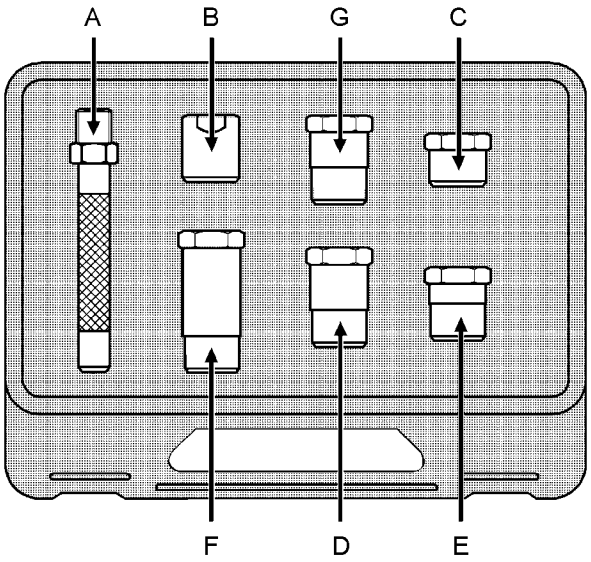
Risk of injury due to unsecured brake calliper.

- Clean the contact areas (fitting collars) to the guide pins on the brake anchor plate (2).
- Remove the guide pins (8, 9) from the brake calliper (1).
- Remove the protection caps (5) from the ring groove of the Brake calliper (1).



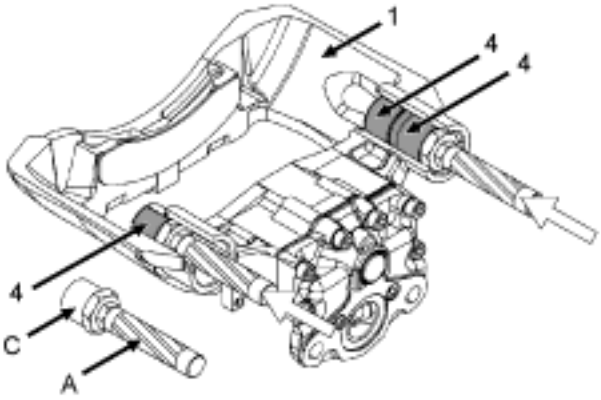
– Place the brake calliper (1) on a firm base for pressing out the bushings (4). The cover opening of the brake calliper must face upwards.

For replacing the bushes use the tools from WABCO tool box 12 851 021 and pay attention to the detailed mounting instructions in the tool box.



A	Pin
B	Fitting tool for closing covers
C	Extrusion mandril
D, E, F, G	Insert mandril

– Press the bushings (4) out of the brake calliper (1) using the pin (A) and the extrusion mandril (C).

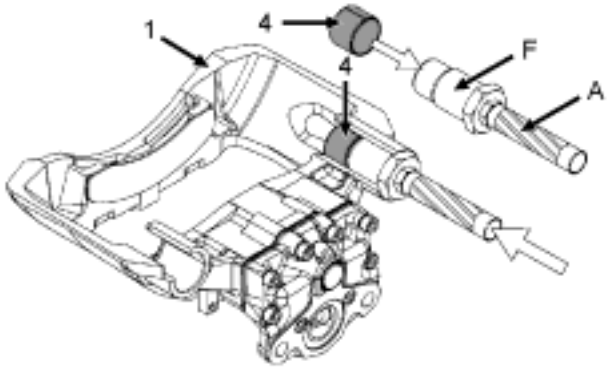


– Clean the bores in the calliper.

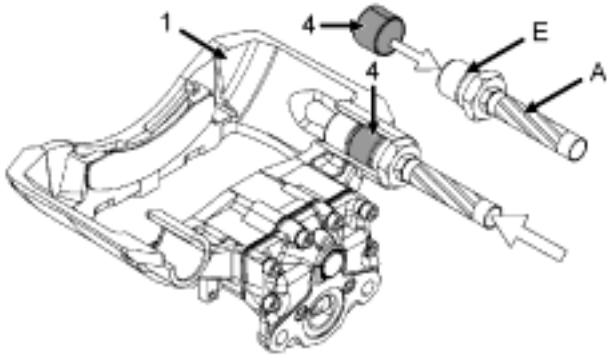
Assembly

Press in two **new** bushings for the longer guide pin.

– Use pin (A) and insert mandril (F) to press the inner bushing (4) into the bores of the brake calliper (1) on the brake disc entry side right to the end stop of the insert mandril.

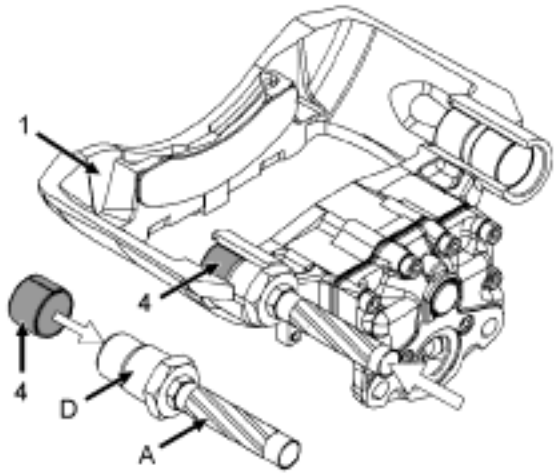


– Use the pin (A) and the insert mandril (E) to press the outer bushing (4) into the same bore right up to end stop.



– Grease the space between the bushings and the sliding surfaces of the bushings.

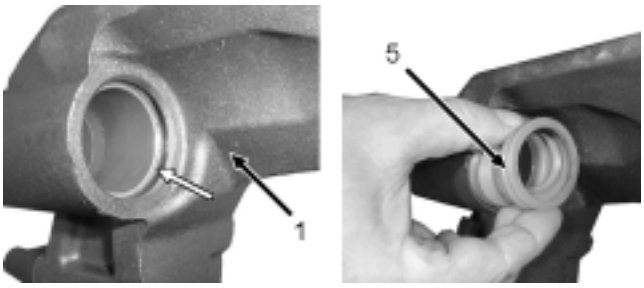
– Use pin (A) and insert mandril (D) to press a new bushing (4) for the short guide pin into the bores of the brake calliper (1) on the brace disc exit side right to the stop position of the insert mandril.



– Grease the sliding surfaces of the bushings.

– Clean the sealing seats (ring groove) of the brake calliper for the protection caps. The sealing seats must be free of grease.

– Push the new green protection caps (5) into the sealing seats (ring groove) of the brake calliper (1).



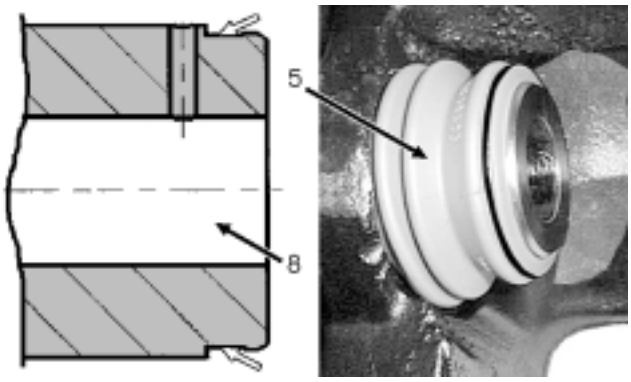
– Grease the sliding surfaces of the guide pins (8, 9) and the inner lip of the gaiters (5).

– Insert a **new** long guide pin (8) from the cylinder side into the calliper (brake disc leading side).

– Insert a **new** short guide pin (9) from the cylinder side into the calliper (brake disc trailing side).

– Slide the protection caps (5) over both guide pins.

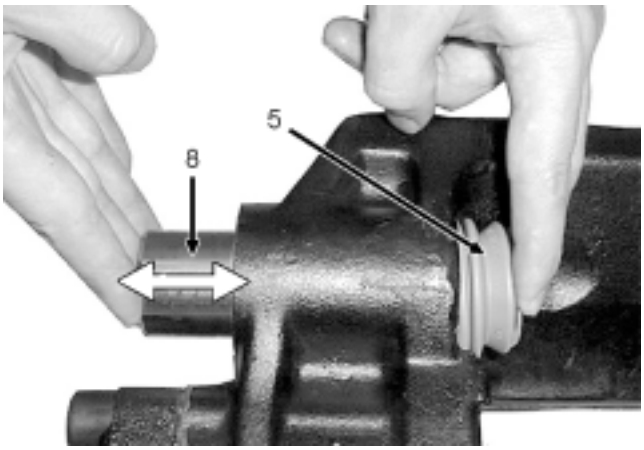
– Position the beaded edge of the protection caps (5) into the sealing seats (ring grooves) of the guide pins (8, 9). Ensure that the metal-ring does not move off gaiter.



Ensure that the beaded edge of the protection caps (5) have an even and wrinkle-free seat on the brake calliper (1) and the guide pins (8, 9).

– Remove any excess grease. The plane surfaces of the guide pins to the brake anchor plate and the contact areas of the brake anchor plate must be free of grease.

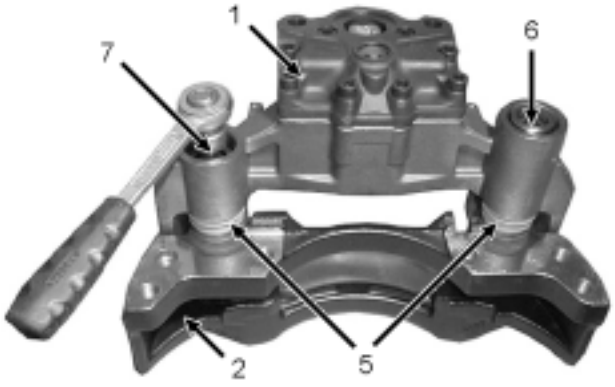
– Manually move the guide pin in the bushings backwards and forwards and check for ease of movement.



– Place the calliper (1) on the brake anchor plate (2) and the inserted guide pins (8, 9) into the fitting collar.

– Insert new screws (6, 7) through the guide pins inserted in the brake calliper (1). Use the long screw (6) for the long guide pin (8) and the short screw (7) for the short guide pin (9).

– Fasten the screws to the brake anchor plate (2) (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item IV).



On assembly ensure that the gaiters (5) are not damaged or twisted during tightening the bolts (6, 7).

Always tighten the longer guide pin (8) with press-fit first and then the shorter guide pin (9) with clearance.

If the guide pins (8, 9) are released from the brake anchor plate (2) during the maintenance work, new screws (6, 7) must be used for reassembly.

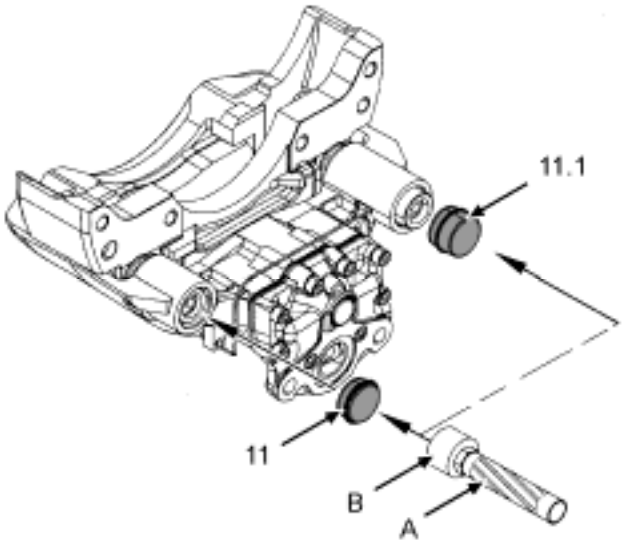
– Manually move the brake calliper on the guide pins (8, 9) across the entire displacement path and check for ease of movement; repeat the action a number of times.

Do not squeeze the guide pin protection caps against the brake anchor plate while moving the calliper.

– Grease the bores for the closing cover (11, 11.1) in the brake calliper (1).

– Insert the new closing covers (11, 11.1) into the bores of the brake calliper (1). Use the long closing cover (11.1) for the long guide pin (8) and the short closing cover (11) for the short guide pin (9).

– Press in the closing cover right up the end position using the fitting tool for closing covers (A, B) from the WABCO tool box 12 851 021.



Avoid damaging the covers while pressing them in.

– Install the brake, brake linings and brake cylinder (see chapter 5.2 "Installing the brake", page *21*).

6.2 Renewing the protection cap of the adjuster screw

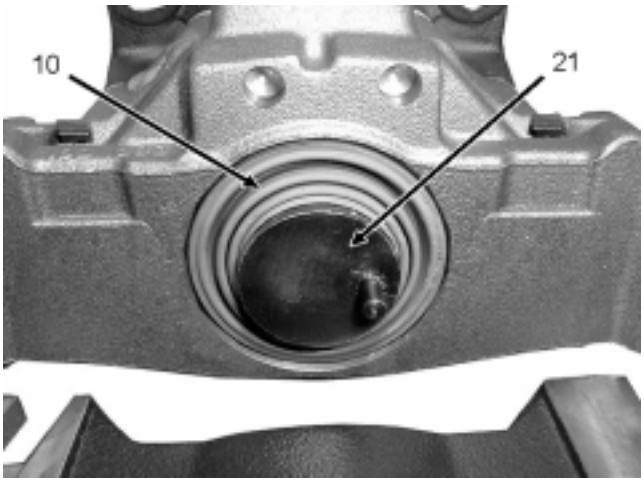
If the gaiter is removed individually, brake calliper and brake cylinder need not be dismantled.

Removing the gaiter

– Remove the brake linings and the pressure plate (see chapter 4.1 "Removal of the brake linings", page *14*).

– Push the calliper towards the cylinder side by hand.

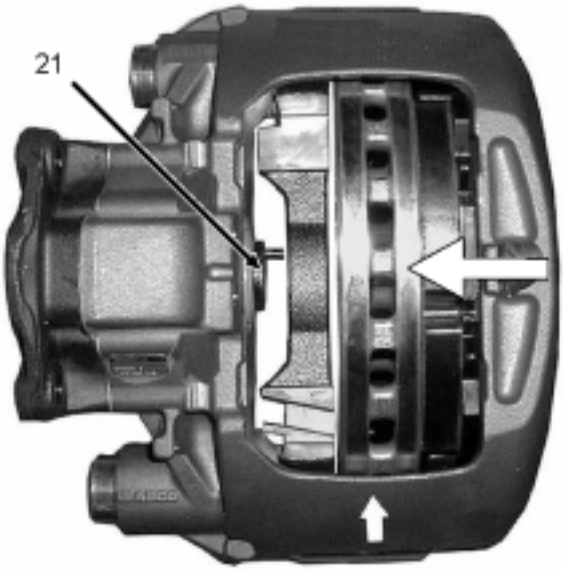
– Pull the protection cap (10) from the sealing seat (ring groove) of the adjuster screw (21).



– Remove the protection cap (10) from the sealing seat of the brake calliper.

– Check the brake calliper. If dirt or moisture has entered the brake, or if the sealing seat in the brake calliper or the thread of the adjuster screw is damaged, replace the brake (see chapter 5 "Renewing the brake", page *20*).

– Fit the rim side brake lining into the lining slot so that the adjuster screw cannot be screwed out of the adjuster completely.



– Secure the adjuster screw (21) on the pin against twisting.

– Use a ring spanner to turn the hexagon (22) anti-clockwise until the adjuster screw has been screwed outwards approx. 30 mm by this action (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item I).

– During this process, check the thread of the adjuster screw (21) for corrosion and damage. If the thread is damaged or corroded, renew the brake (see chapter 5 "Renewing the brake", page *20*).

The gaiter (10) can be renewed, if no dirt or water has penetrated into the brake calliper, or if the gaiter has been damaged during servicing the brake.

– Clean the sealing seat (arrow) of the gaiter (10) in the brake calliper.

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

– Grease the thread of the adjuster screw (21).

– Use a ring spanner to turn the hexagon (22) anti-clockwise until the adjuster screw has been partially turned inwards through this action.

– Remove the brake lining from the lining slot on the rim side.

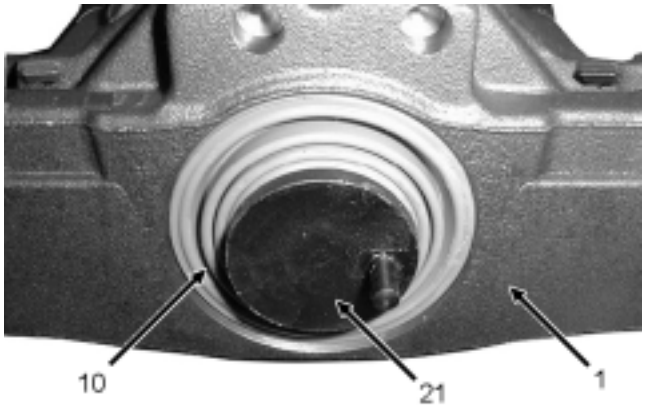
Fitting the gaiter

– Slide a new protection cap (10) over the adjuster screw.

– Centre the protection cap and push it into the sealing seat of the brake calliper (1) by hand.

– Grease the beaded edge of the protection cap (10).

– Insert the beaded edge of the protection cap (10) into the sealing seat of the adjuster screw (21).



Ensure that the cap has a correct sealing seat in the brake calliper (1) and that the beaded edge of the protection cap (10) has an even and wrinkle-free seat in the ring groove of the adjuster screw (21).

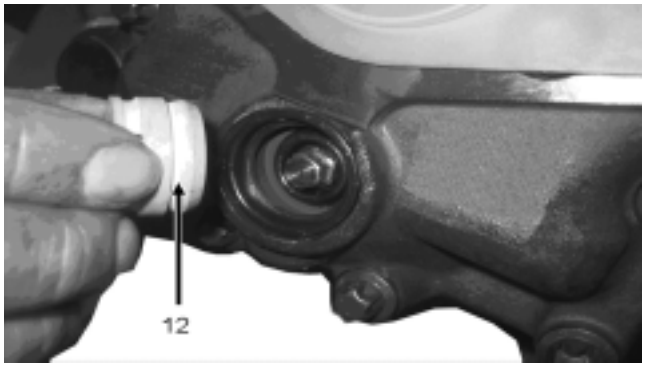
– Install the pressure plate and the brake linings, and set the clearance (see chapter 4.3 "Fitting the brake linings", page *17*).

6.3 Renewing the gaiter on hexagon nut of the adjuster

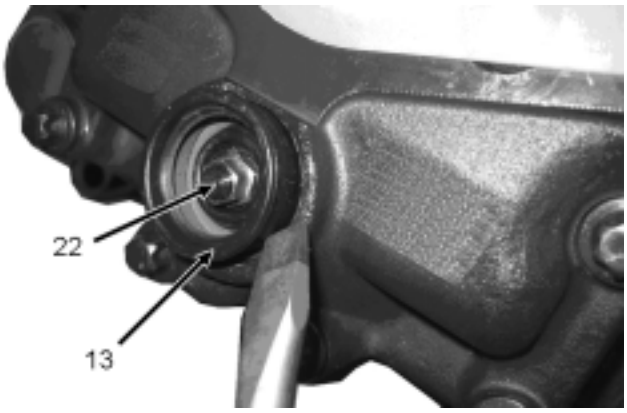
If the gaiter is removed individually, brake calliper and brake cylinder need not be dismantled.

Removing the gaiter

– Remove the sealing plug (12) of the adjuster.



– Push the gaiter (13) using a tool (e.g. screwdriver) from the seat of the brake calliper and remove the gaiter (13) of the hexagon (22) of the aduster.



– Clean the sealing seat (arrow) of the gaiter (13) in the brake calliper.

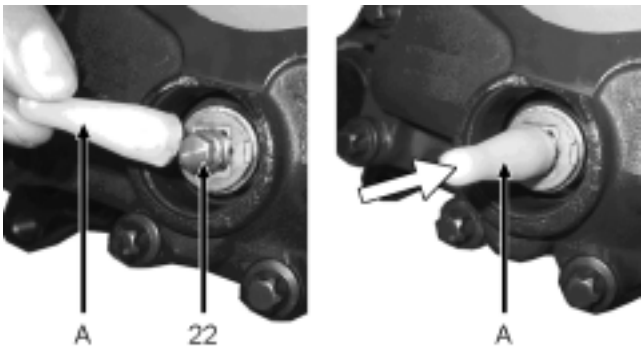
Ensure that no dirt or moisture enters the brake when cleaning.

– Check the brake calliper. If dirt or moisture has entered the brake, or if the sealing seat in the brake calliper or the hexagon (22) of the adjuster screw is damaged, replace the brake (see chapter 5 "Renewing the brake", page *20*).

The gaiter (13) can be renewed, if no dirt or water has penetrated into the brake calliper, or if the gaiter has been damaged during servicing the brake.

Fitting the gaiter

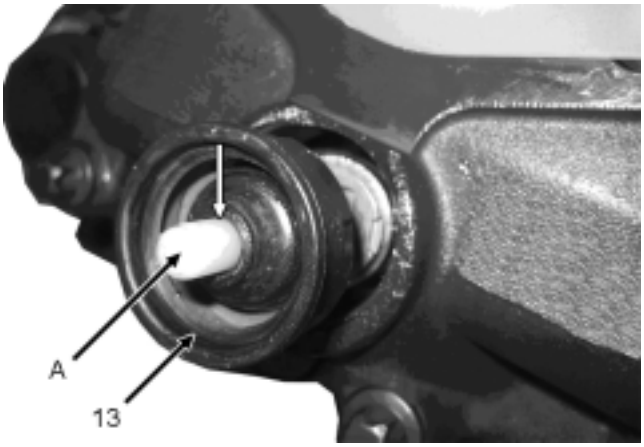
– Place the mounting cap (A) onto the hexagon (22) of the aduster and push the mounting cap right up to the stop.



– Grease the inner lip (arrow) of a new gaiter (13) slightly.

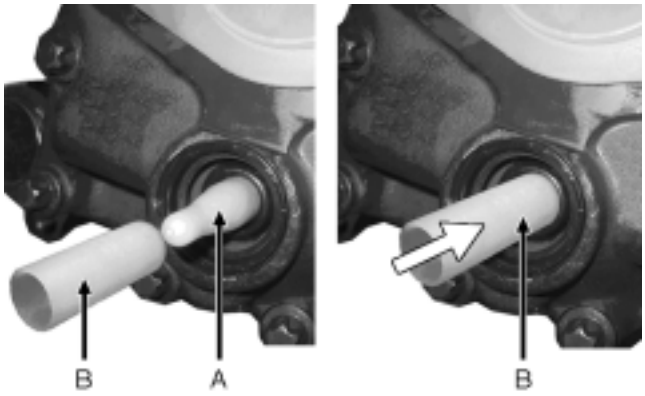
– Place the gaiter (13) onto the mounting cap (A).

– Push the gaiter (13) by hand into the sealing seat of the brake calliper (1) right up to the stop.



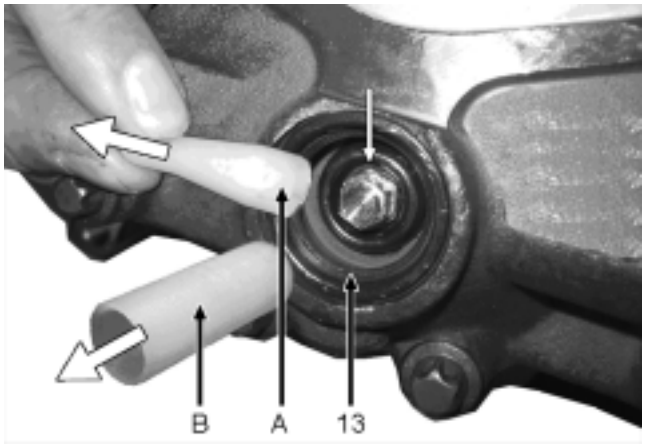
– Place the mounting sleeve (B) onto the mounting cap (A).

– Press the mounting sleeve (B) against the inner gaiter lip towards, that the inner gaiter lip fit correct in the annular groove of the adjuster.

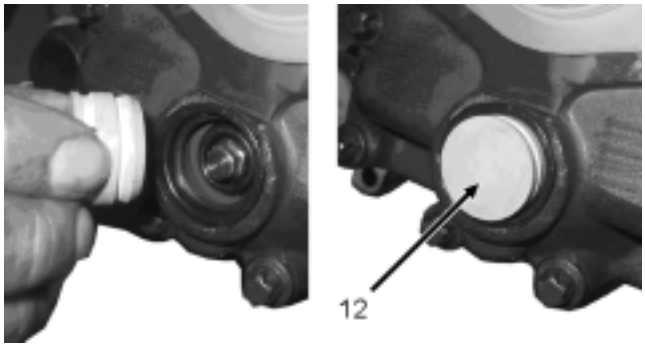


– Remove mounting sleeve (B) and mounting cap (A).

– Check and make sure the correct seat of gaiter (13) in the brake calliper and annular groove (arrow) of the adjuster.



– Push a new sealing plug (12) into the gaiter (13) of the adjuster. Ensure that the sealing plug (12) has a tight seat.



7 Replacing the brake cylinder

CAUTION **Risk of injury**

- Observe all safety instructions, as well as all repair and maintenance instructions (see chapter 1 "Important instructions and safety instructions", page *5*).
- These instructions must be observed to avoid personal injury or material loss.

Only use brake cylinders as specified by the vehicle manufacturer.

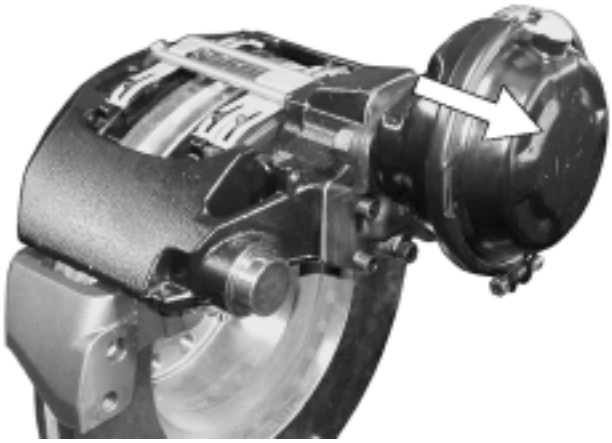
The instruction to replacing the brake cylinder serves as general information. Observe the installation guidelines as well as instructions for testing and installation of the brake cylinder manufacturer and adhere it strictly.

Removing the brake cylinder

– Unscrew the air connection from the brake cylinder.

Ensure that the air connection of the brake cylinder is pressureless.

– Unscrew the brake cylinder nuts (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item V).
– Remove the brake cylinder from the brake calliper.



Ensure that no dirt or moisture enters the brake when removing the brake cylinder.

Installing the brake cylinder

– Clean the sealing area on the brake calliper and grease the calotte in the brake lever (arrow).

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

– Attach the brake cylinder to the brake calliper and screw the brake cylinder manually with new fastening nuts until the brake cylinder rests against the surface of brake calliper.

– Screw the brake cylinder with approx. 120 Nm.
– Tighten the fastening nuts with approx. 210 - 30 Nm (see chapter 8.1 "Widths A/F and tightening torques", page *31*, item V).

Always use new fastening nuts for the installation of brake cylinder.

Depending on the installation position of the brake, ensure that the lower drainage aperture of the brake cylinder facing the ground is open. All other drainage apertures must be sealed by plugs.

– Screw the air connection to the brake cylinder.

Observe the instructions of the manufacturer of brake cylinder in this regard.

– 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 calliper and does not obstruct brake calliper movement.

– Check the air connection for tightness.

– Perform a function and effectiveness test of the brake.

8 Annex

8.1 Widths A/F and tightening torques

Table 1 (see also drawing on the next page)

Item	Designation	Width A/F	Hexagon screw		Tightening torque (Nm) Comments
			external	inside	
I	Hexagon adjuster	8	X	–	Direction of rotation of the hexagon • Adjust anti-clockwise (left), maximum 3 Nm: air gap decreases • De-adjust clockwise (right), maximum 12 Nm: air gap increases
II	Screw for lining retainer	17	X	–	30 + 15 Nm
III	Brake fastening screwed connection	Observe the installation guideline of the axle or vehicle manufacturer and adhere it strictly.			
IV	Guide pin screwed connection	14	–	X	310 ± 30 Nm Tightening sequence for guide pins: • 1. long hexagon socket screw (fit pin) • 2. short hexagon socket screw (clearance fit pin)
V	Brake cylinder screwed connection	24	X	–	210 – 30 Nm[1)] • Screw on the fastening nuts manually till the brake cylinder rests against the surface. • Tighten the fastening nuts with approx. 120 Nm. • Tighten the fastening nuts with 210 – 30 Nm. Use fastening nuts only once.

[1)] The tightening torques apply for original WABCO cylinders

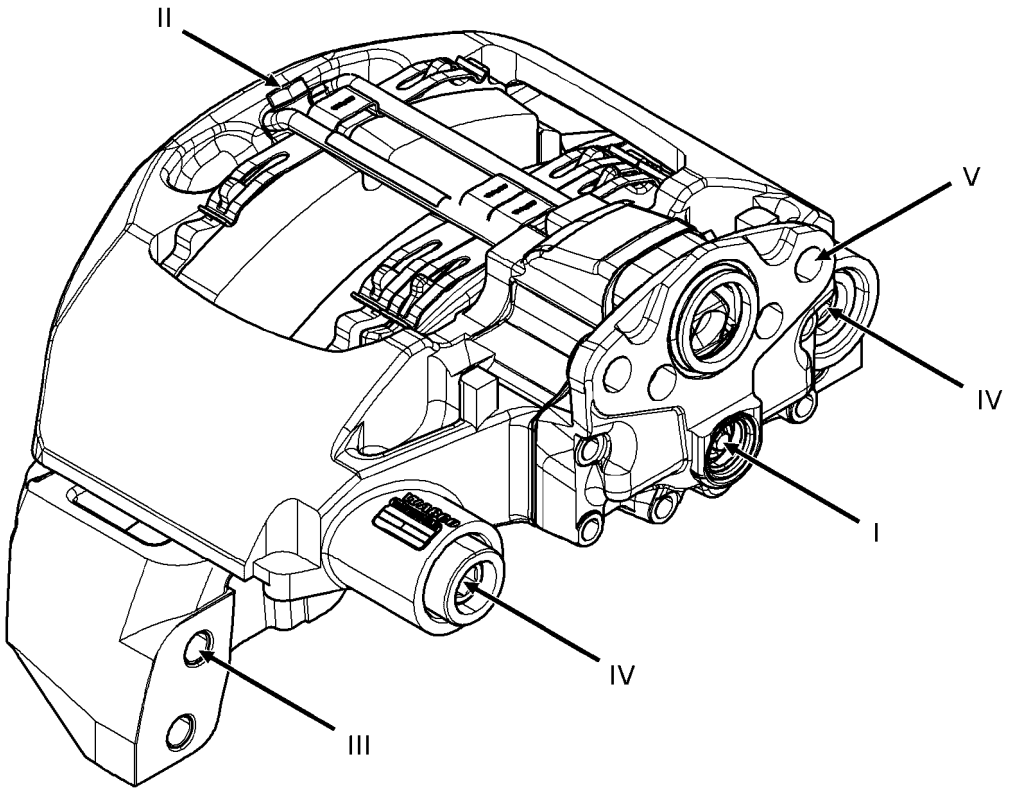


fig. 8-1: Display of positions of widths A/F and tightening torques

8.2 Exploded view of the replacement parts

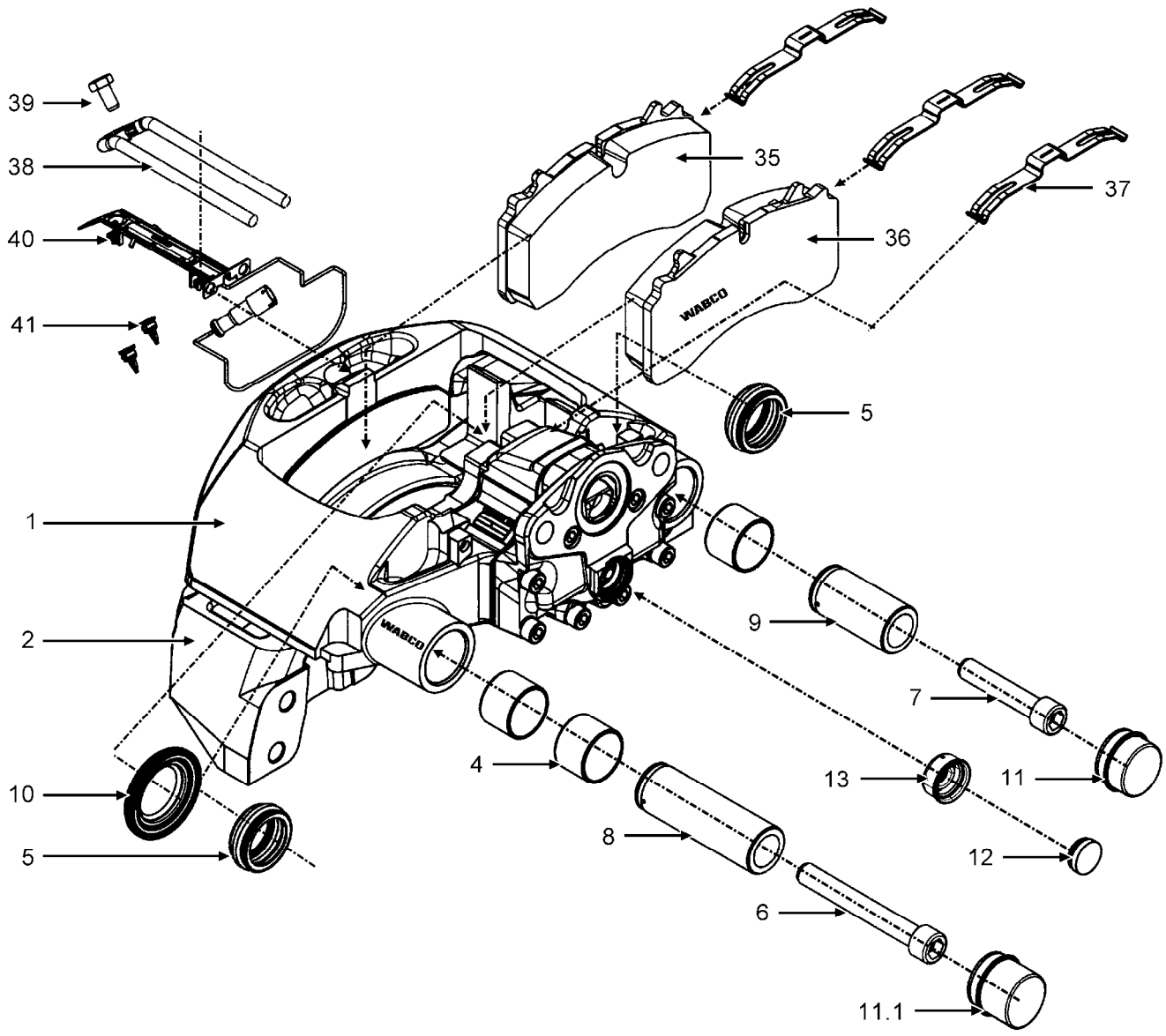


fig. 8-1: Illustration of a left brake

1	Brake calliper
2	Brake anchor plate
4	Bushes for guide pins
5	Protection caps for guide pins
6	Internal hexagon bolt (long)
7	Internal hexagon bolt (short)
8	Guide pin (long)
9	Guide pin (short)
10	Protection cap for adjuster screw
11	Closing cover (short)
11.1	Closing cover (long)
12	sealing plug of the adjuster
13	Protection cap for the hexagon of the adjuster
35	Brake lining rim side
36	Brake lining cylinder side
37	Hold-down springs
38	Lining retainer
39	Hexagon screw
40	Cable guide with wear indicator
41	Clip

8.3 Procurement and disposal of spare parts

Procurement of spare parts

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

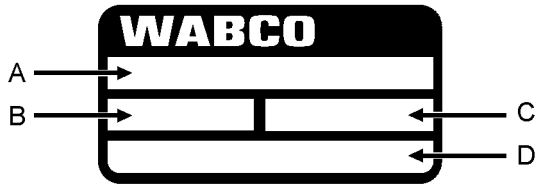
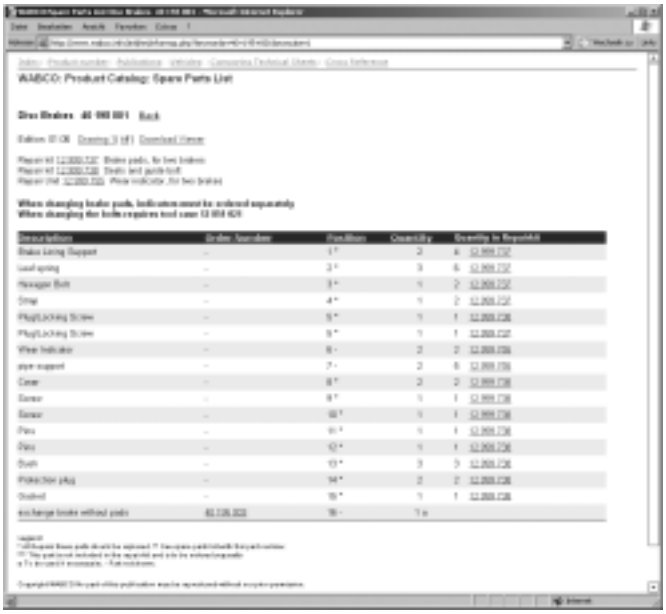


fig. 8-1: WABCO type plate

A Vehicle manufacturer part number
B Production date
C Assembly number
D WABCO part number

– Open INFORM at www.wabco-auto.com
– Enter the WABCO part number of the brake calliper.
– Click "Repair".
– Open the spare part sheet.



Disposing of the brake components

– Dispose of used and replaced parts in accordance with the national and regional regulations regarding environmental protection.

Generally brake components can be scrapped.

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.
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