

■ **Assembly and  
Maintenance Instructions**  
Mechanical Sliding Caliper Disc Brake  
Type **PAN 19-1** 

■ 1<sup>st</sup> Edition

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## **Note:**

The Service Instruction focuses on trained specialists. Operations on the brake can only be carried out if the appropriate paragraphs have been read through and understood. The safety instructions according to paragraph 2.1 are to be considered and to be followed.


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## 1. Description the Mechanical Sliding Caliper Disc Brake

### 1.1 Introduction

The brake **PAN 19-1**  is a new developed one-piston-brake, which is intended for use in commercial vehicles and trailers on front and rear axles for 19,5" or 22,5" wheel rims as service, auxiliary and parking brake. It is actuated mechanically via a diaphragm brake cylinder or a spring brake cylinder. This is mounted to the end cover of the brake caliper.

A very compact unit is achieved by the direct mounting of the brake cylinder onto the caliper. This enables optimal utilisation of the installation situations.

The complete disc brake including brake cylinder consists of two assemblies:

- Brake caliper (1)
- Brake Carrier (2)

The radially open design of the brake caliper allows for 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.

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

The disc brake is equipped with an electrical wear indicator / sensor (40).

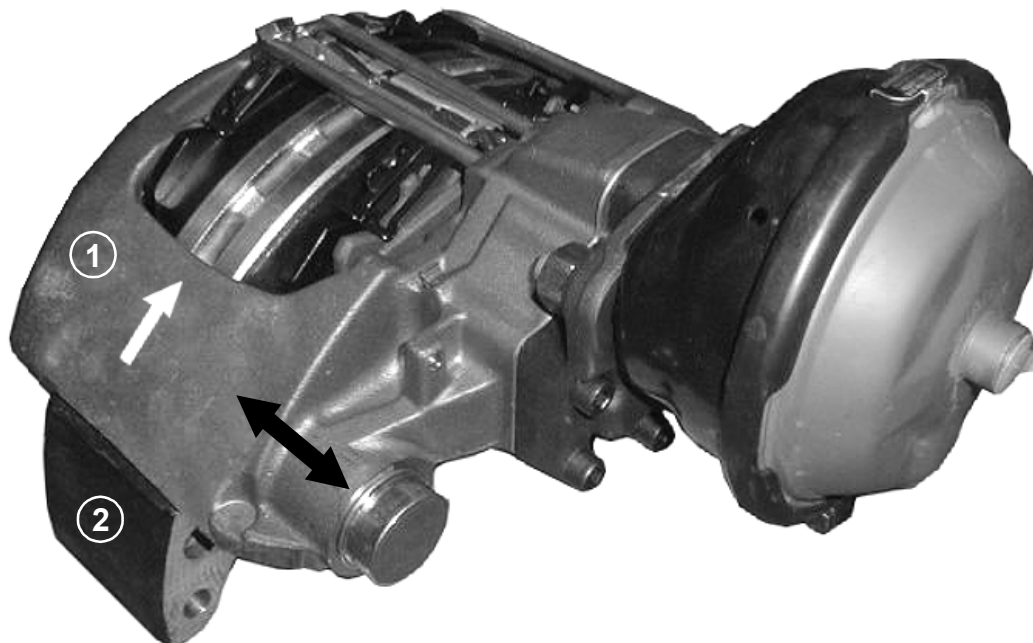


Fig. 1

## 2. Service Instructions

This instruction with the following pictures contains the required steps and work sequences to replace the available repair kits. The spanner size and the tightening torques in the sequences are listed in Table 1 (see page 26).

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

### 2.1 Safety tips to be considered during repair

The flawless technical condition of the disc brake is most important to ensure good driving and safe braking characteristics.



Observe brake pad and disc wear limits! Worn-out pads and discs reduce the brake effectiveness and cause brake failure! Danger of accidents! Burned, glazed or oil contaminated brake pads must be replaced immediately.

**Always replace brake pads on a per axle basis!**



During repairs on the brake the vehicle must be parked on a level surface be blocked to prevent to prevent rollaway. Only approved and suitable fixtures are to be used for the lifting and blocking of the vehicle. While working on the brake it must be ensured that the brake cannot be actuated inadvertently. Do not actuate the brake while the brake pads are removed. Danger of Bodily Injury!



Do not clean the brake with pressurised air or other high cleaning pressure apparatus. Danger of Bodily Injury!



Keep hands and fingers out of the inside of the caliper to avoid injury!



A second technician must assist during removal and installation of the brake. Heavy Load - Danger of Bodily Injury!



During repairs outside of the vehicle, the brake must be secured in a fixture, such as a heavy vise as high torque is required during removal and installation of the bolts. Danger of Bodily Injury!

The brake caliper with clamping unit shall not be opened. Therefore the bolts holding the cover shall not be loosened.

Only original and genuine WABCO Service Parts and approved brake pads are to be used.

During repairs use only recommended tools. Do not use a power-driven socket or tools! Tighten nuts and bolts only to specified torque limits.

With newly installed brake pads on the first 50 km no emergency stops should be made. Also avoid long braking cycles and force brakings.

When wear of the cast brake parts such as cracks or heavy abrasion is noticed replace the entire brake assembly according to the instructions.

Upon completion of repairs the vehicle's braking system must be tested on a roller dynamometer. If no roller dynamometer is available a driving test with brake applications must be performed.

### 2.2 Checking Brake Function



**Caution:**

**Do not use a power-driven socket! While working at the brake or moving of the brake caliper handle the caliper only from outside to avoid injury!**

**2.2.1 Checking Adjuster Function**

**General Note:**

The turning directions and the torques for the hexagon on the adjuster nut are given in Table 1, Position I.

**Work sequences:**

- Remove plug (12) for the adjuster from the caliper (22) carefully.

**Caution:** On disassembly the proper tool position is against the plug 12 (left side in Fig. 2)!

Do not place the tool between caliper and outer side of the sealing ring otherwise there is a danger of the damaging the inner sealing (right side in Fig. 2)

- Using a SW8 ring spanner (Table 1, Position I) turn the adjuster (22) hexagon approx. 1/2 turn in the clockwise direction.

**Caution:**

**Do not overload the adjuster hexagon! Do not use an open-ended spanner. With the ring spanner mounted on the adjuster nut ensure that there is sufficient such that it will not be prevented from turning during the adjuster check.**

- Actuate the brake about approx. 5 times (apprx. 1 bar) The adjuster is functioning when the ring spanner (arrow) turns in the anti-clockwise with every brake actuation.

**Note:** With increasing adjustment increments the angular movement of the ring spanner becomes smaller.

The adjuster is in order when the ring spanner rotates as described above.

- Remove ring spanner.
- Refit plug (12) ensure that the plug is placed properly.

**Failures that might occur:**

The adjuster (22) respectively ring spanner (arrow)

- does not turn
- turns only with the first actuation
- turns forward and backward with every actuation

then the adjuster is not ok.

**Change the brake according to Section 4!**

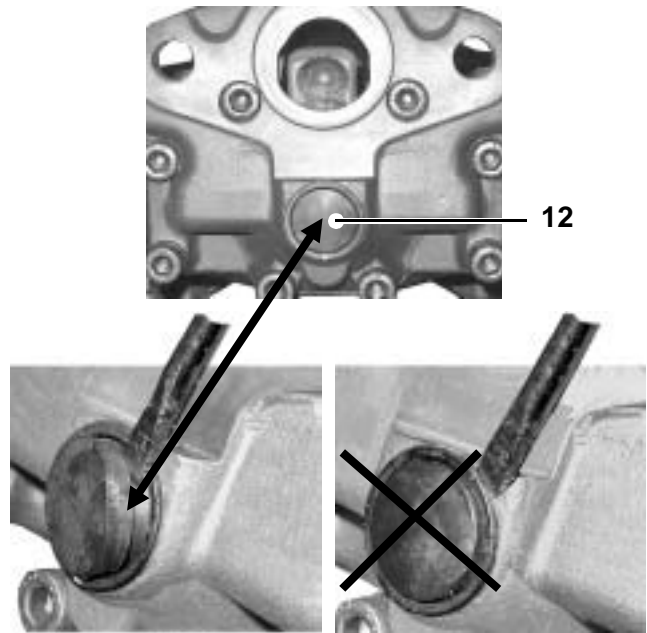


Fig. 2

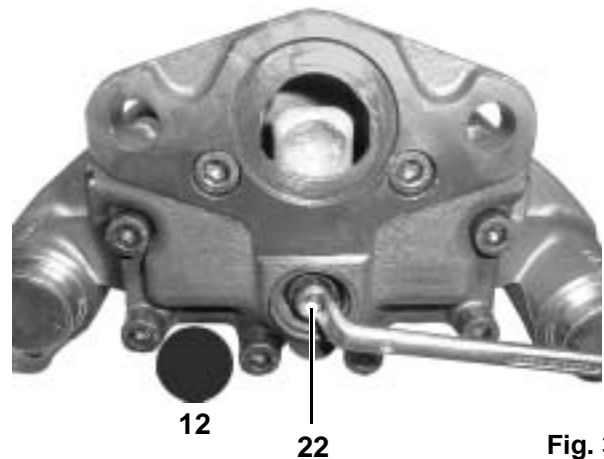


Fig. 3

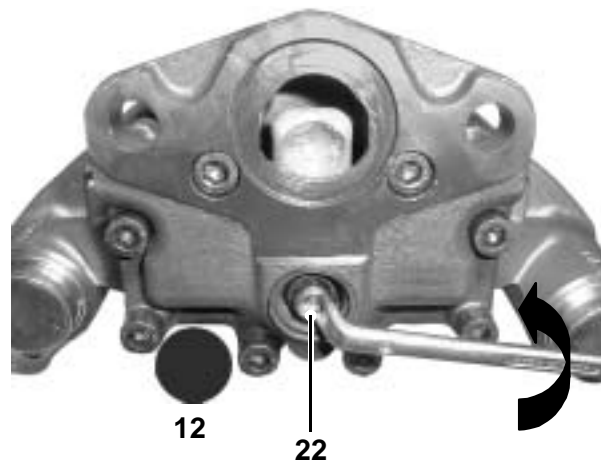


Fig. 4

## 2.3 Checking Brake Pads

**Note:** the brake pad thickness is to be checked regularly depending on operating conditions during maintenance intervals and under applicable local laws and regulations. Burned, glazed or oil contaminated brake pads must be replaced immediately.

**Always replace brake pads on a per axle basis!**

**Work sequences:**

**Caution:**

**To avoid damage to the brake disc, the brake pads should be replaced at the latest when the thinnest section of the friction material is 2 mm.**

The thickness of the residual friction material should not be less than 2 mm.

**A** = residual friction material thickness 2 mm.

**B** = total friction material thickness 21 mm

At residual friction material thickness **A < 2 mm** renew brake pads according to Section 3.

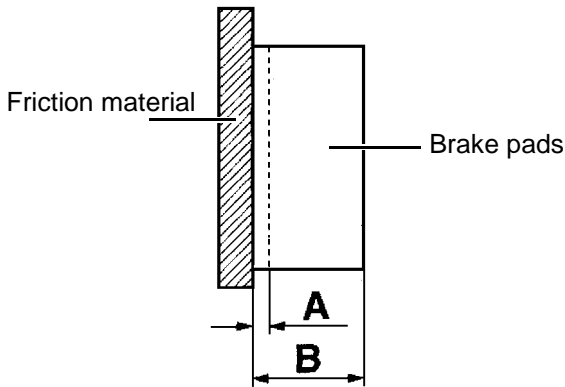


Fig. 5

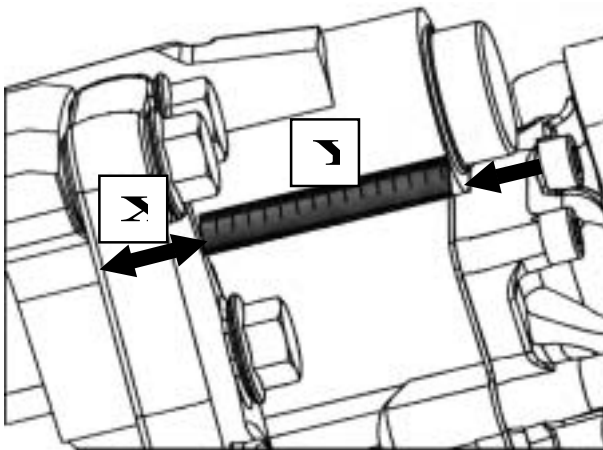


Fig. 6

### Measuring of Wear

The average brake pad wear can be measured, depending on the access, at the close fit (longer guide pin at the brake disc entry) or at the clearance fit (shorter guide pin at the brake disc exit).

Therefore measure the thickness (**X**) of the flange of the axle and the distance (**Y**) between the flange and the edge of the brake caliper of the particular close fit (arrows).

The maximum wear is reached or exceeded with the following values.

#### shorter guide pin

maximum wear  $X+Y > 95$  mm Change lining

#### Longer guide pin

maximum wear  $X+Y > 122$  mm Change lining

## 2.4 Checking brake disc

### Work sequences:

- Remove brake pads according to section 3 and measure thickness disc over the rubbing faces.

**C** = total disc thickness - new 45 mm

**D** = wear allowance limit 37 mm  
**the brake disc must be renewed.**  
**The renewal is recommended on a per axle basis.**

**E** = total pad thickness - new 30 mm

**F** = pad backplate thickness 9 mm

**G** = minimum residual friction material thickness 2 mm

**H** = absolute minimum pad thickness 11 mm  
**the brake pads must be renewed.**

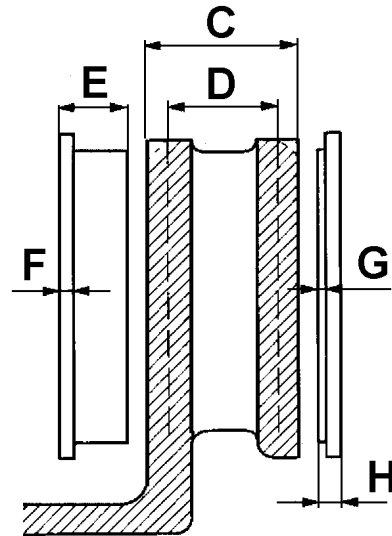


Fig. 7



**Caution:**  
**Observe brake pad and disc wear limits!**  
**Worn-out pads and discs reduce the brake effectiveness and cause brake failure! Danger of accidents!**

## 3. Renewing Brake Pads



**Caution:**  
**Do not use a power-driven socket! While working at the brake or moving of the brake caliper handle the caliper only from outside to avoid injury!**

### Working sequences for removal of pads:

- Disconnect cable of the wear indicator 40 at the plug (arrow).
- Remove hexagon bolt (39) with spanner SW 17 (Table 1, position II) from pad hold-down hoop (38).

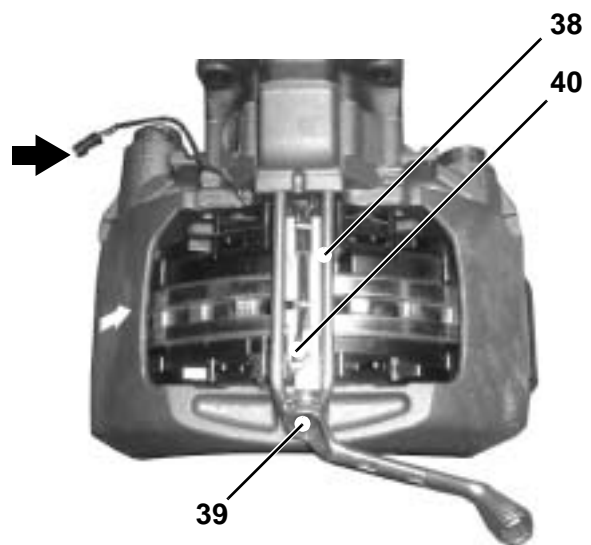


Fig. 8

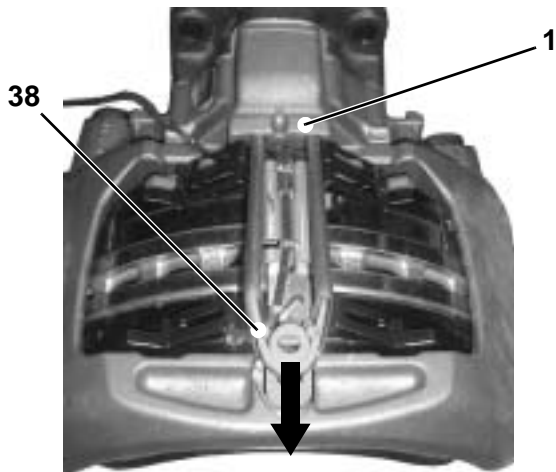


Fig. 9

- Pad hold-down hoop (38) has to be withdrawn from the caliper (1).

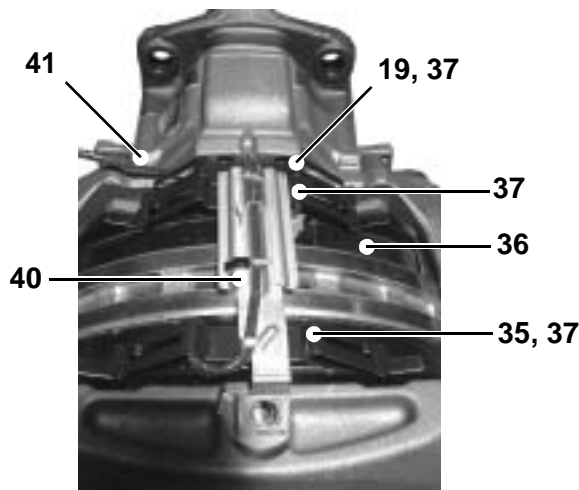


Fig. 10

- Remove three hold-down springs (37) from the brake pads (35 and 36) and the spreader plate (19).
- Remove cable guide (40) and contacts from the brake pads.
- Both cable clips (41) have to be removed of the brake caliper.

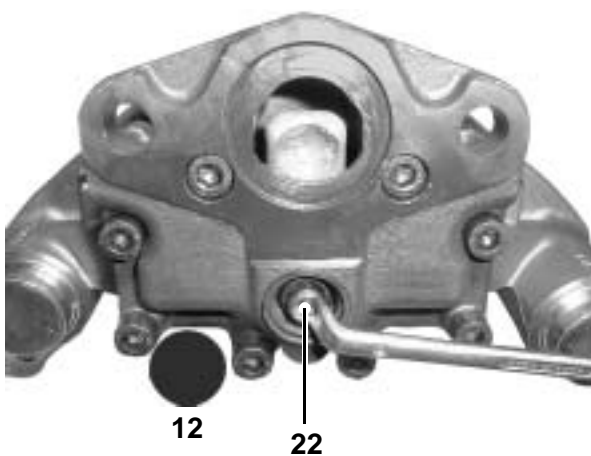


Fig. 11

- Remove plug (12) for the adjuster (22) of the caliper (1) carefully.  
**Caution:** While disassembling plug (12) please note the instructions for fig. 2!
- De-adjust the brake by rotating the hexagon on the adjuster nut (22) with a ring spanner than release by approx. 1/4 turn.

**Note:** The turning direction to de-adjust is to the right, that means clockwise.

**Caution:**

When re-adjusting push back the spreader plate (19) by hand to ensure that the pin as torsion lock (Fig. 17) for the adjusting screw does not slip out of its groove.

Otherwise the danger exists that the adjuster screw will turn thereby damaging its gaiter!

- Slide the caliper (1) by hand towards the wheel side and remove the brake pad (35).

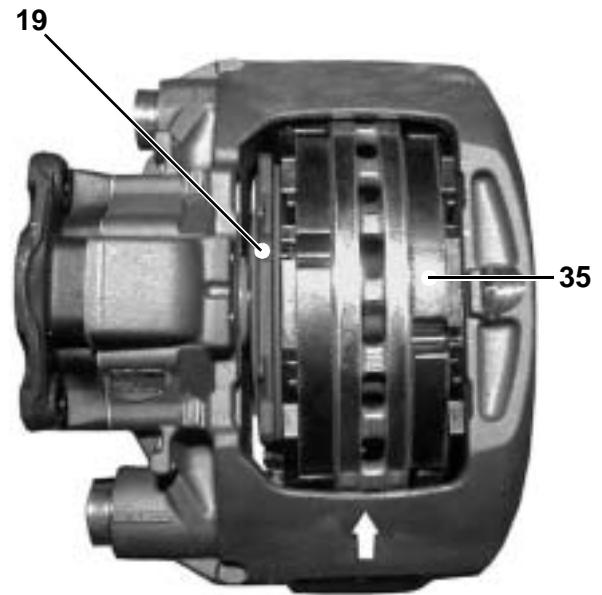


Fig. 12

- Slide the caliper (1) by hand towards the wheel side and remove the brake pad (36) and the spreader plate (19).

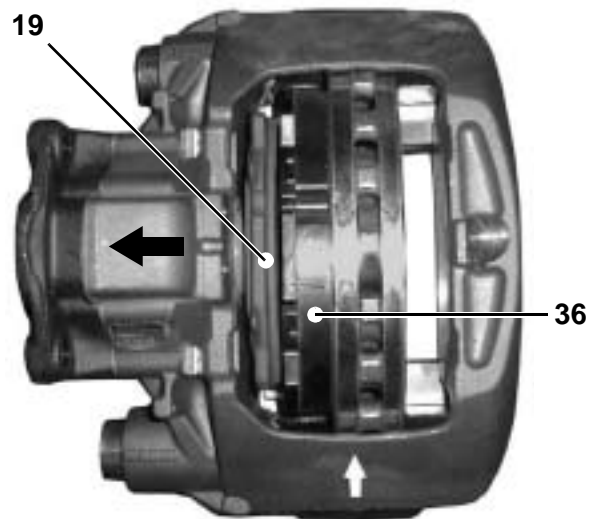


Fig. 13



**Caution:**

Do not actuate the brake while the brake pads are removed. Danger of Bodily Injury!

- Using a wire brush remove any corrosion from the spreader plate, brake pad slot and brake pads guide surfaces.

**Caution:**

Take care not to damage the dust caps (5, 10). The guide surfaces must be free of grease!

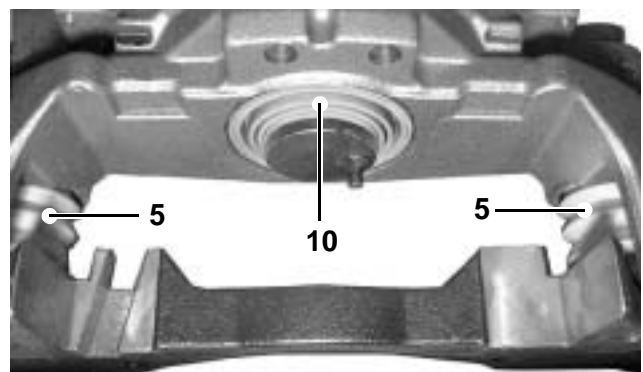


Fig. 14

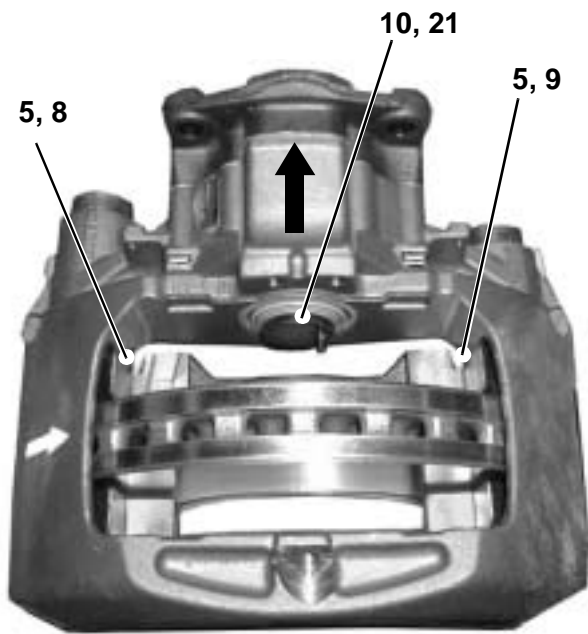


Fig. 15

### Checking of the Dust Caps (Gaiters) and the Brake Caliper Movement:

- Slide the caliper towards the side to allow examination of the gaiters (5, 10), the guide pins (8, 9) and the adjuster screw (21) for wear and damage. **Renew all defect gaiters according to Section 5.1 and 5.2**

#### Caution:

In case of a defective the gaiter (10) must be checked if dirt or water has already entered or damaged the inner parts of the brake or the gaiter seat in the caliper by corrosion. In case of doubt the brake must be renewed according to Section 4. If the gaiter (10) is damaged while the brake is serviced, the gaiter must be renewed according to Section 5.2.

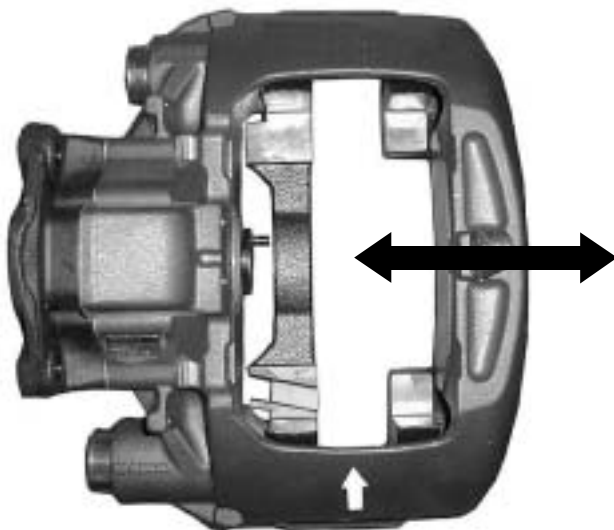


Fig. 16

- Slide the caliper on the guide pins by hand over its total displacement and check for freedom of movement. **If the movement is restricted renew the guide pins bushes and gaiters according to section 5.1**

#### Caution:

Do not squeeze the dust caps of the guide pins against the torque plate!

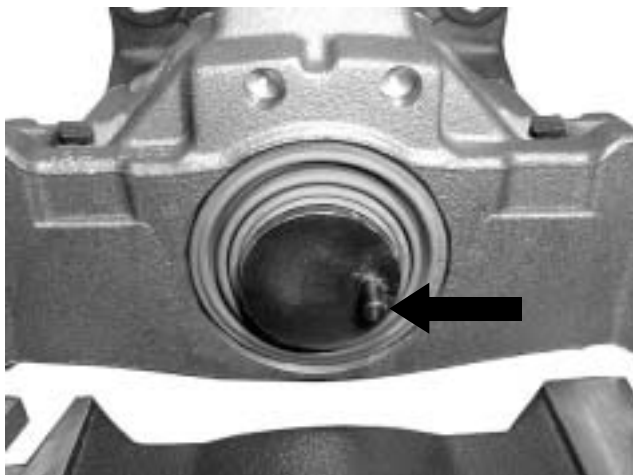


Fig. 17

### Checking of the Adjuster Unit (Clamping Unit):

- Prevent the adjuster screw from turning during the test and while rotating by the adjuster hexagon e.g. holding the pin (arrow).

- Extend the adjuster (22) towards the brake disc by turning the adjuster hexagon in the anti-clockwise direction with a ring spanner and check for ease of movement.
- After checking the adjuster unit return the adjuster screw completely by turning in the clock-wise direction.

**Note:** The torque to return the adjuster screw is greater than the torque to turn the torque towards the disc.

**Caution:**

**Do not overload the adjuster hexagon! Do not use an open-ended spanner. With the ring spanner mounted on the adjuster nut ensure that there is sufficient such that it will not be prevented from turning during the adjuster check.**

- Actuate the brake lightly several times and check that the adjuster unit automatically adjusts. The ring spanner will turn with every brake actuation.

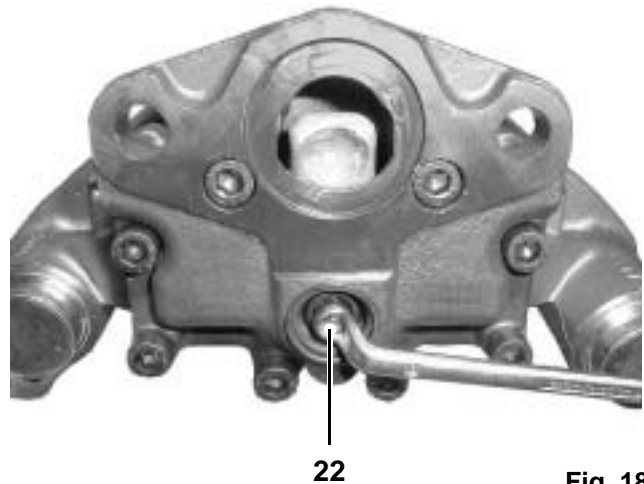


Fig. 18

**Brake Disc Condition Inspection:**

Check brake disc for cracks, condition of the rubbing faces and maximum wear dimension.

- |  |                   |
|--|-------------------|
| <b>A</b> = crazing   | = permissible     |
| <b>B</b> = Radial cracks<br>to max: 0.5 mm width           | = permissible     |
| <b>C</b> = unevenness under 1.5 mm<br>of the plate surface | = permissible     |
| <b>D</b> = continuous cracks                               | = not permissible |
| <b>a</b> = braking surface                                 |                   |

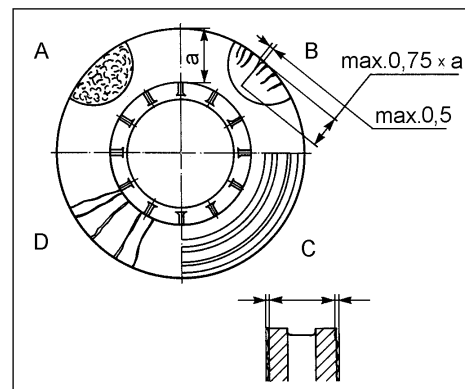


Fig. 19

**Checking brake disc runout:**

- Mount a dial indicator on the brake carrier.
- With the disc installed measure the runout by rotating the hub as shown in Fig. 20 Limit 0.15 mm .

**Note:** At higher values rework or renew the disc. Installation of cleaned brake discs only. The brake discs must be free of grease!

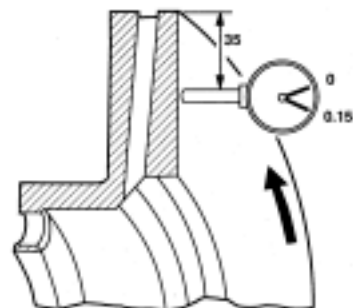


Fig. 20

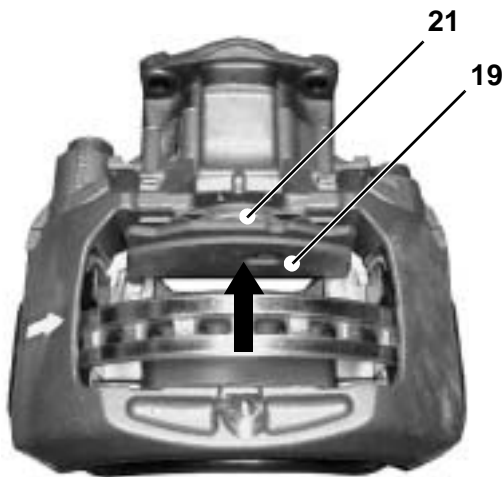


Fig. 21

### Working sequence for Pad Installation:

- Slide the caliper until there is sufficient space between the actuation side and the disc to insert the brake pad.
- Insert spreader plate (19) in the brake carrier and engage with the adjuster screw (21).

#### Caution:

The spreader plate must be located within the brake carrier abutments and the pin in the adjuster screw must be located in the slot of the spreader plate. Otherwise the function of the adjuster mechanism is not ensured! The adjuster screw can be turned to obtain alignment. The gaiter may not be twisted!

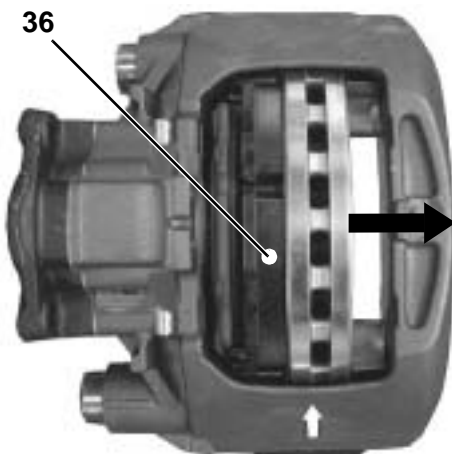


Fig. 22

- **New** brake pad (36) has to be inserted on the actuating side
- Slide the caliper toward the wheel until the brake pad (36) contacts the disc.

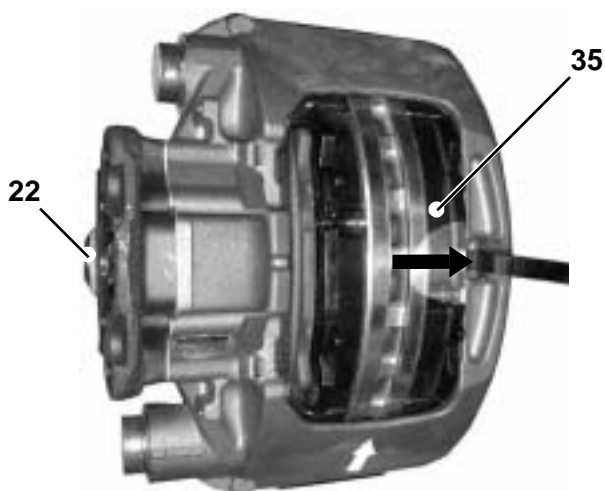


Fig. 23

- **New** brake pad (35) has to be inserted on the wheel side.
- Using a 1 mm thick feeler gauge (arrow) inserted between the backing plate of the brake pad on the wheel side and the brake caliper, turn the hex nut (22) of the adjuster screw with a closed end wrench until both brake pads contact the brake disc.

#### Caution:

**Do not overload the adjuster hexagon (22)!**

#### Note:

The turning direction to adjust the break is to the left, that means anti-clockwise. Do **not** fit pad hold-down hoop before adjusting air gap.

- Fit new cable clips (41) to the brake caliper.
- Install new pre-assembled wear indicator and the cable guide (40) and insert sensor contact into the brake pads.

**Caution:**

The sensor contacts must be pointed in the direction of the brake disc and the contacts must be properly seated!

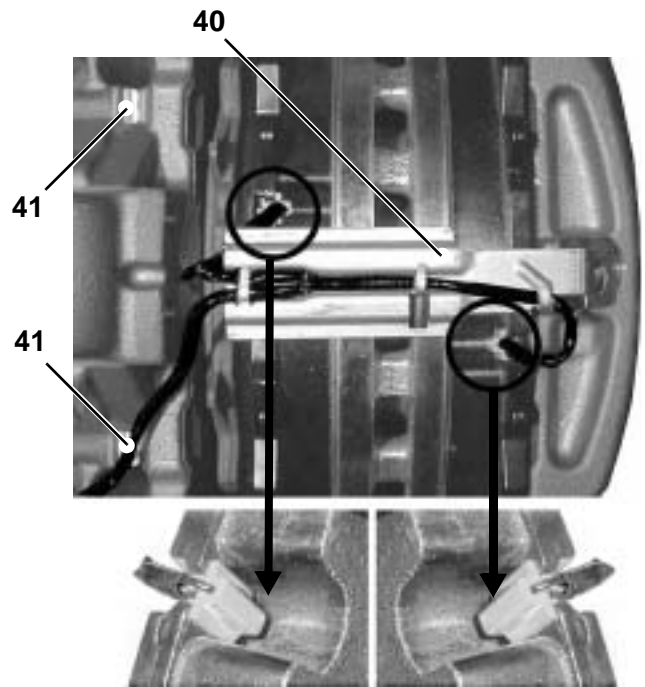


Fig. 24

- Raise cable guide (40),
- Place three new hold down springs (37) under the cable guide and on top of the spreader plate and the brake pads.

**Caution:**

Route cables on the actuation side so that they do not rest on the brake pad (see cable position to the Fig. 25).

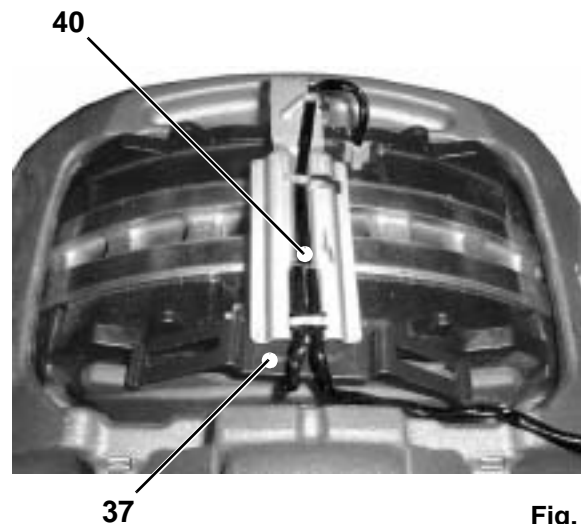


Fig. 25

- Then push cable guide against the hold-down springs and position on brake caliper.



Fig. 26

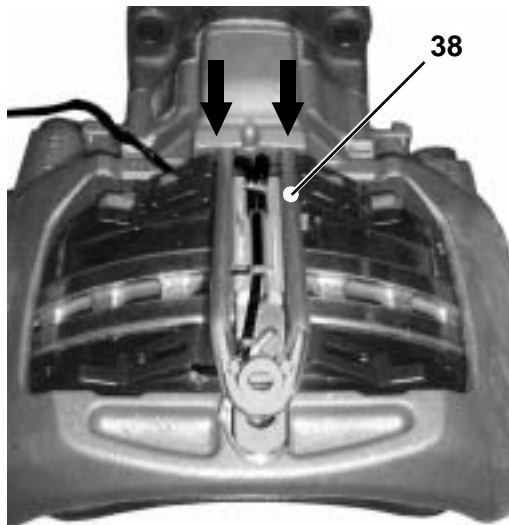


Fig. 27

- Insert **new** pad hold-down hoop (38) in the holes (arrows) of the brake caliper and then push downward so that the radial corners of the hold down springs snap into the hold down hoop.

**Note:** The hoop has to be installed above the cables of the wear indicator.

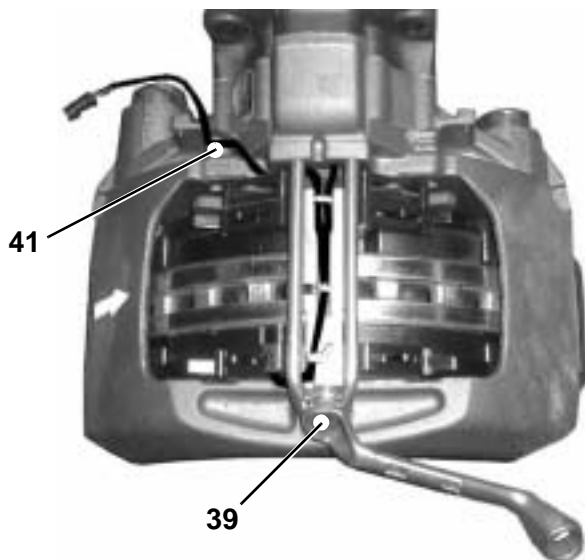


Fig. 28

- Fit **new** hexagon bolt (39) to the brake caliper (Table 1 Position II) with required tightening torque.
- Connect wear indicator cable plug to mating end on vehicle side.
- Secure exit cable on **new** cable clip (41).



Fig. 29

- Check the correct cable position.

- Fit new plug (12) to the opening in the brake caliper!  
**Check and make sure the correct seat!**
- Check that the hub rotates freely.

**Caution:**

**Upon completion test the brakes on the roller dynamometer!**



12

Fig. 30

## 4. Renewing Brake



**Caution:**

**Do not use a power-driven socket! While working at the brake or moving of the brake caliper handle the caliper only from outside to avoid injury!**

**Note:** The new brake is supplied as a pre-assembled unit and may be mounted to the vehicle's axle via the brake carrier. **Observe left (Illustration A) and right (Illustration B) brake configurations.** The removed brake pads must be tested according to section 2.3 for wear. **If the use of new brake pads is necessary the renewal is recommended on a per axle basis.**

**Work Sequences for Brake Removal:**

- Remove brake pads according to Section 3.
- Remove brake cylinder from brake caliper according to Section 6.
- Dismantle the caliper with the carrier from the axle (Table 1, Position III).
- Check brake disc according to Section 2.4.



Fig. 31



Fig. 32

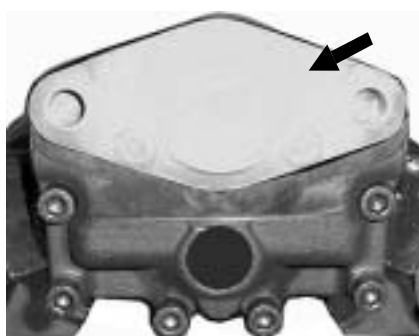


Fig. 33

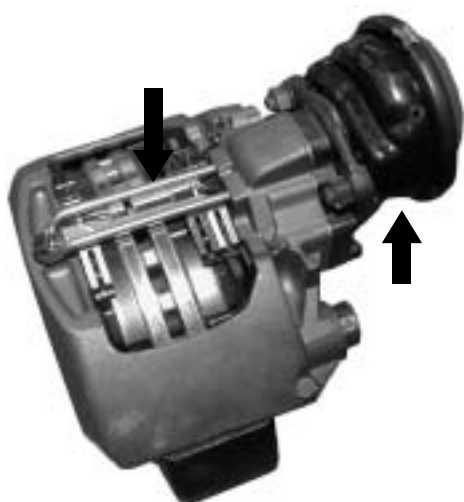


Fig. 34

## Work Sequences for Installing Brake:

- Place the new brake with the brake carrier over the brake disc and mount on the axle. Tighten hexagon bolts with spanner (Table 1, Position III).

**Note:** Special assembly instructions of the vehicle manufacturer have to be noted.

- Remove the transport protection cap from the cylinder flange on the brake caliper.

- Refit brake pads and sprader plate according to Section 3.
- Refit the brake cylinder on the caliper according to Section 6.

**Caution:**  
With the brake cylinder in its installed position, ensure that the lower drainage hole facing the ground is open! All other holes must be plugged!

## 5. Renewing Gaiters



**Caution:**

**Do not use a power-driven socket! While working at the brake or moving of the brake caliper handle the caliper only from outside to avoid injury!**

**Note:** When replacing all of the gaiters in the caliper, the work sequences 5.1 and 5.2 are to be combined. In this case work sequences need not to be repeated several times.

When replacing individual gaiters, follow the corresponding work sequences of the sections 5.1 and 5.2.

### 5.1 Renewing Guide Pin Gaiters and Bushes

**Working Sequences for Removal:**

- Remove brake pads according to Section 3.
- Remove brake cylinder from brake caliper according to Section 6.
- Dismantle the caliper with the carrier from the axle according to Section 4.

- Dismantle brake caliper (1) from brake carrier (2) by removing short and long caps (11, 11.1) from the guide pins (8, 9) in the caliper housing with a suitable tool, e.g. chisel.

**Caution:**

**Take care not to damage cover bores in housing. The proper tool position is against the cover.**



Fig. 35

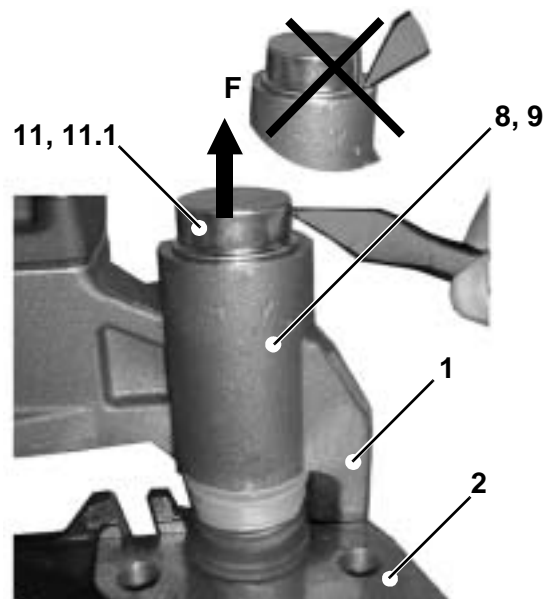


Fig. 36

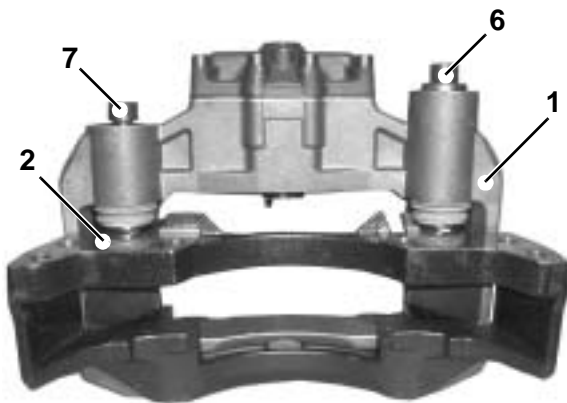


Fig. 37

- Release the bolts (6, 7) with a male socket (Table 1, Position IV) and separate the caliper (1) from the carrier (2).



**Caution:**  
Moving Brake Caliper: Danger of Bodily Injury!

- Clean the mating surfaces (collars) of the carrier (2).

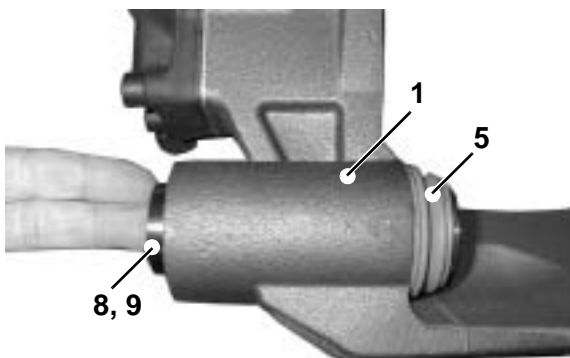


Fig. 38

- Withdraw the guide pins (8, 9) and remove the gaiters (5) from the caliper1.

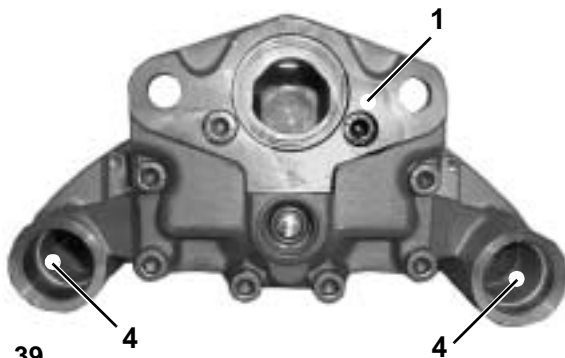


Fig. 39

- Place the caliper (1) on a firm base to push out the bushes (4), so that the caliper opening is facing upwards.



Fig. 40

- Press the bushes (4) out of the caliper (1) using a mandrel.
- Clean the bores in the caliper.

**Working sequence for Installation:**

- Press in two new bushes (4) for the longer guide pin (8).
- Firstly (A) fit the inner bush with the special fitting tool ( $L_1$ ) and secondly (B) the outer bush with the special fitting tool ( $L_2$ ) by pressing in as far as the mandrel abutment. **Use special fitting tools from WABCO case no. 12 851 021.**
- Grease the bushes and the space between them.

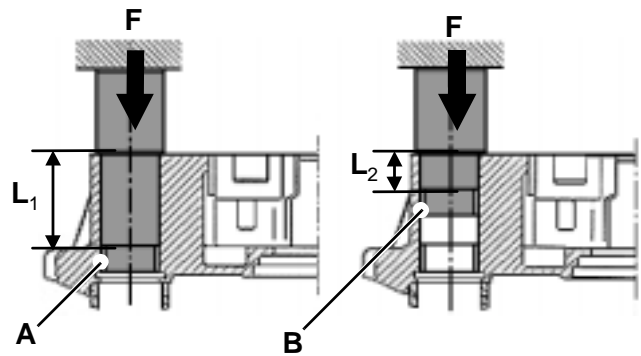


Fig. 41

- Press in new bush (4) for the shorter guide pin (9).
- Fit the bush (C) with special fitting tool ( $L_3$ ) by pressing in as far as the mandrel abutment. **Use special fitting tools from WABCO case no. 12 851 021.**
- Grease the bush.

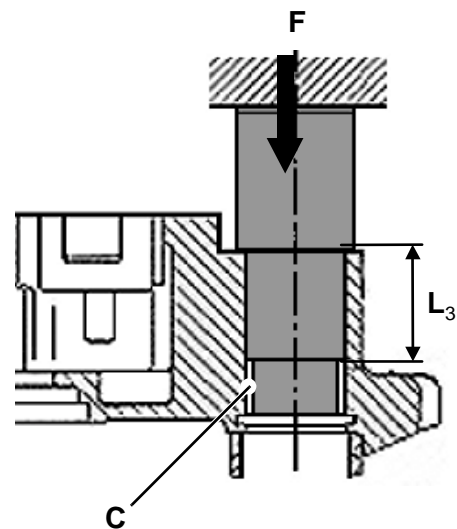


Fig. 42

- Fit new green gaiters (5) in the gaiter seats (ring groove/arrow) in the brake caliper (1).

**Note:** Clean gaiter seats before fitment. The sealing seats must be free of grease. It is possible to fit the gaiters by hand. **Ensure that the gaiters are fitted evenly into the seats in the brake caliper!**

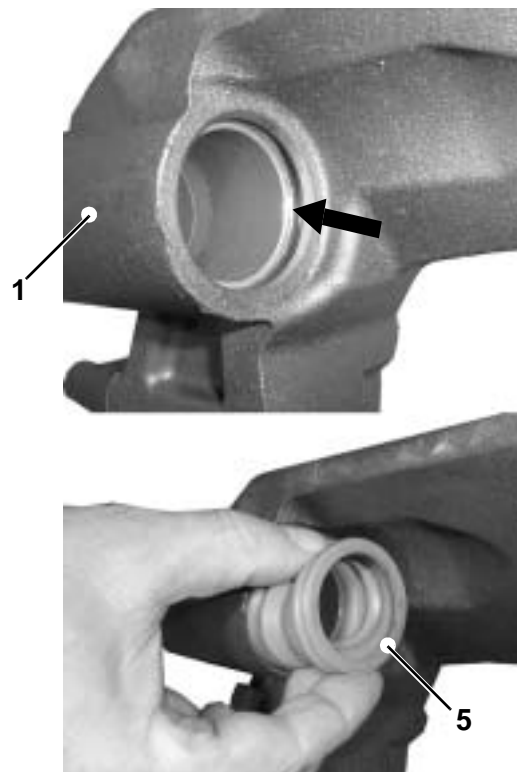


Fig. 43

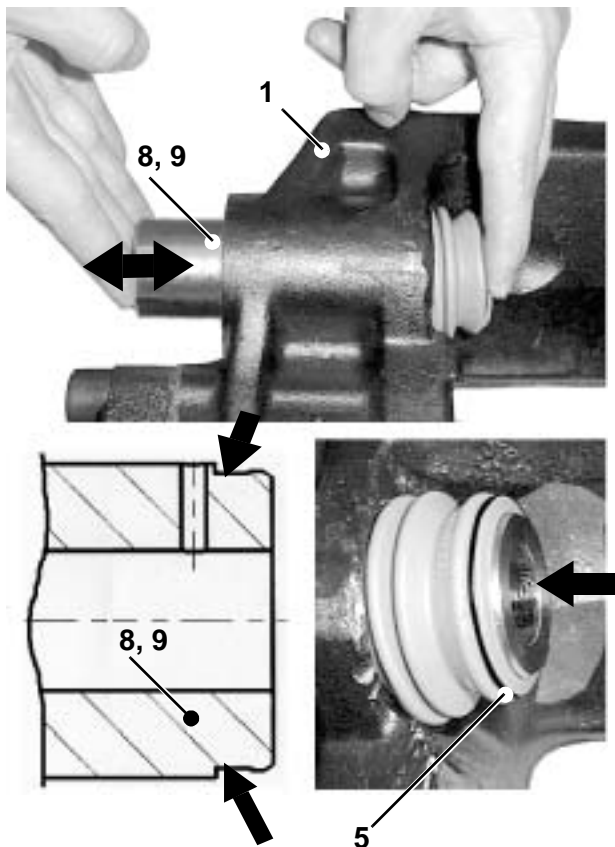


Fig. 44

- Grease the sliding surfaces of the guide pins (8, 9) and the inner lip of the gaiters (5).
- Insert the **new** guide pins from the cylinder side into the caliper (1), and
- push gaiter (5) against its guide pin seat (8, 9).
- Move guide pins backwards and forwards as shown in Figure 44 several times. Check for ease of movement.

**Caution:**

The longer guide pin (8) is a close fit and is located at the brake disc leading side. The shorter guide pin (9) is a clearance fit and is located at the brake disc trailing side.

Remove all excess grease. The brake carrier end of the guide pins (arrow) and the mating surfaces of the carrier must be free of grease!

Do not lose the metal-ring on gaiter 5 and check the proper seat (right side in Fig. 44)!

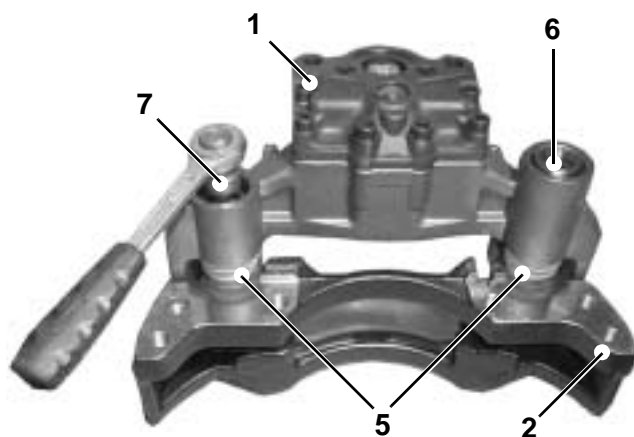


Fig. 45

- Place the caliper (1) on the carrier (2) and insert the guide pins (8, 9) into the collars in the carrier.
- Insert **new** bolts (6) (long for close fit pin 8), (7) (short for clearance fit pin 9) into the guide pins in the brake caliper (1).
- Screw bolts to the brake carrier (2) with spanner (Table 1, Position IV).

**Caution:**

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

Firstly, tighten the bolt for the close fit longer pin (8), followed by the bolt for the clearance fit shorter pin (9).

Should during the maintenance work the guide pin (8, 9) fastening to the carrier (2) be loosened, then new bolts (6, 7) must be used when reassembling!

- Move brake caliper backwards and forwards on guide pins (8, 9) several times. Check for ease of movement.

**Caution:**  
Do not squeeze guide pins dust caps against brake caliper!

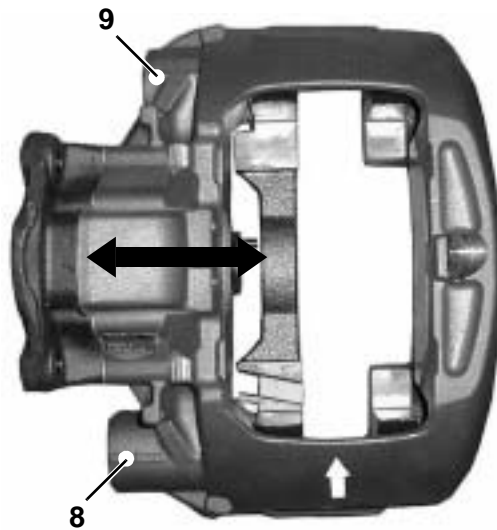


Fig. 46

- Lubricate the bores for the caps (11, 11.1) in the brake caliper (1).
- Place **new** caps (11, 11.1) in the bores in the brake caliper and press home with a suitable tool.

**Note:** Fit the long cap (11.1) on the longer guide pin (8). Take care to avoid damaging the covers.

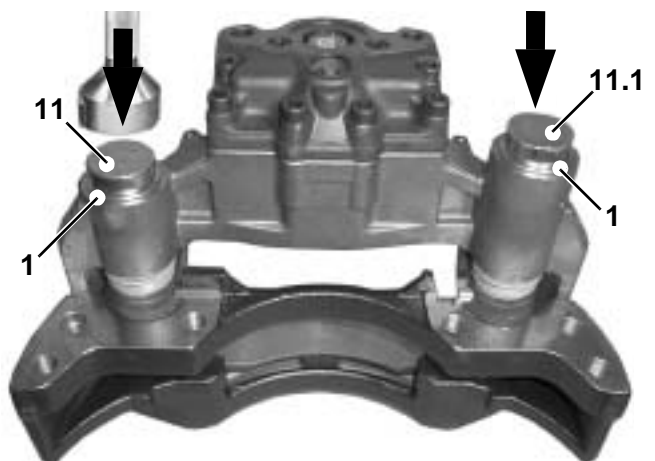


Fig. 47

- Mount brake over the brake disc on the axle according to Section 4.

**Note:** Special assembly instructions of the vehicle manufacturer have to be noted.

- Install brake pads and set clearance. Carry out according to Section 3. and pay attention to Notes.
- Before refitting the brake cylinder clean the mounting flange on the caliper and grease the concave seat (arrow) in the brake lever.
- Refit the brake cylinder on the caliper according to Section 6.

**Caution:**  
With the brake cylinder in its installed position, ensure that the lower drainage hole facing the ground is open! All other holes must be plugged!



Fig. 48



Fig. 49

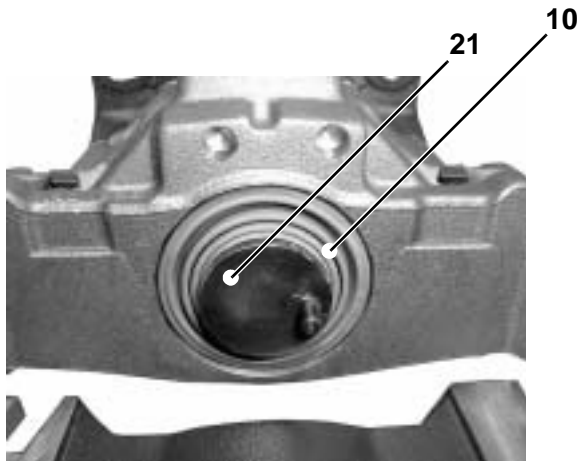


Fig. 50



Fig. 51

## 5.2 Renewing Adjuster Screw Gaiter

**Note:** If the gaiter only is to be renewed it is not necessary to dismantle the brake caliper and cylinder.

### Working Sequences for Removal:

- Remove brake pads and spreader plate according to Section 3.

- Pull brake caliper to actuation / cylinder side by hand.
- Pull the gaiter (10) out the annular groove in the adjuster screw (21).
- Remove the gaiter from the seat in the brake caliper by means of a screwdriver.

- Check the adjuster screw thread.

**Note:** For the purpose refit the wheel side brake pad so that the adjuster screw cannot be screwed completely out of the adjuster. **After the thread check remove the brake pad.**

- Secure adjuster screw (21) against turning (arrow Fig. 51) and screw out the adjuster screw c. 30 mm by turning the adjuster hexagon in the anti-clockwise direction with a ring spanner.
- Examine the thread for corrosion and damage whilst screwing out.

**Caution:**

The gaiter (10) can be renewed, if definitely no dirt or water has penetrated into the brake caliper, or if the gaiter has been directly damaged during servicing the brake. In case of doubt the brake must be replaced according to Section 4., if internal parts are corroded.

- After examination grease the thread and partly screw back the adjuster screw in clockwise sense.

**Working sequence for Installation:**

- Clean the gaiter (10) seat (arrow) in the caliper.
- Push the **new** gaiter (10) over the adjuster screw. Centralise the fitting tool on the gaiter (10) and press the gaiter into the seat in the caliper (1).
- Fit gaiter (10) into ist seat in the adjuster screw (21). Lubricate gaiter lip to ease fitment.

**Note:** Ensure that the gaiter lip in the annular groove in the adjuster screw sits free of folds!

- Install brake pads and set clearance. Carry out according to Section 3. and pay attention to Notes.



Fig. 52



Fig. 53

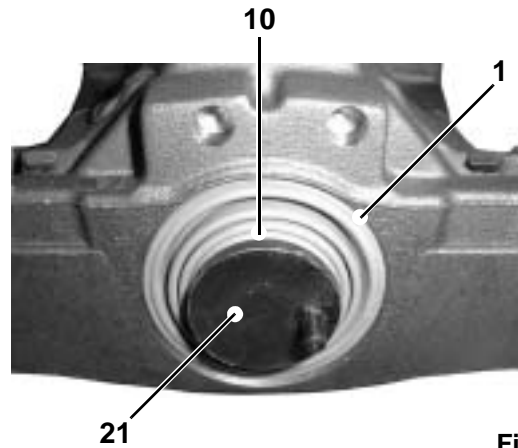


Fig. 54



Fig. 55

## 6. Renewing Brake Cylinder



### Caution:

**Do not use a power-driven socket! While working at the brake or moving of the brake caliper handle the caliper only from outside to avoid injury!**

**Note:** Only use cylinders as specified by vehicle manufacturer. The following work sequences only inform in principle about the assembly and disassembly of the brake cylinder. Detailed assembly and check instructions have to be used according to the cylinder type and the instructions of the cylinder manufacturer.

### Working Sequences for Removal:

- Make sure that the brake hoses are pressureless.
- Disconnect air line to cylinder (according to cylinder manufacturer's data).
- Remove brake cylinder from caliper by releasing cylinder nuts (Table 1, Position V).



Fig. 56

### Working sequence for Installation:

#### Caution:

**With the brake cylinder in its installed position, ensure that the lower drainage hole facing the ground is open! All other holes must be plugged!**

- Before refitting the brake cylinder clean the mounting flange on the caliper and grease the concave seat (arrow) in the brake lever.
- Fit brake cylinder and tighten nuts with spanner (Table 1, Position V).
- Reconnect brake hose to brake cylinder (according to cylinder manufacturer's data).

**Note:** The brake hose must not be twisted or located such that it will rub against anything! The brake hose of the air supply is not allowed to have an influence on the moveability of the brake caliper.

- Test air connection for leaks (according to cylinder manufacturer's data).
- Carry out function and effectiveness tests (according to cylinder manufacturer's data).

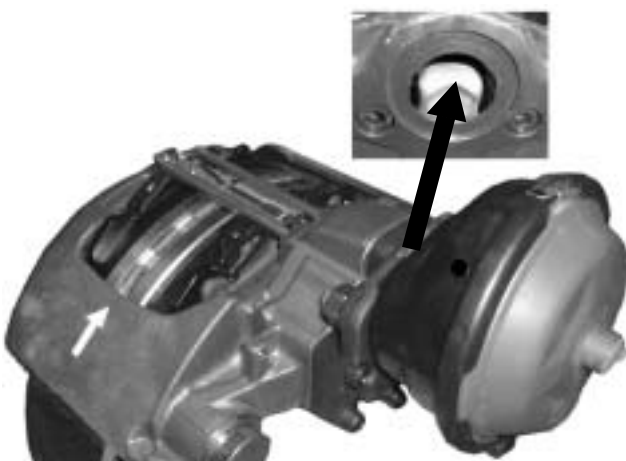


Fig. 57

**Table 1: Tightening torques**

Position	Spanner Width [SW]	Hexagon		Tightening Torque: [Nm]
		External	Internal	
I	8	X	–	Turning direction of the hexagon: <ul style="list-style-type: none"> <li>• Adjust, anti-clockwise (left) maximum 3 air gap decrease</li> <li>• De-adjust, clockwise (right), maximum 12, air gap increase</li> </ul> <b>Caution:</b> <b>Do not use a power-driven socket!</b>
II	17	X	–	30 + 15
III	24	X	–	290 ± 20 recommended Please note the special assembly instructions of the vehicle manufacturer!
IV	14	–		310 ± 30 Tightening order for guide pins: <ol style="list-style-type: none"> <li>1. Close fit pin (long internal hexagon bolt)</li> <li>2. Clearance fit pin (short internal hexagon bolt)</li> </ol>
V	24		–	210 - 30