Maintenance and Repair Manual for SAF Disc Brakes

SK RZ 9019 W with WABCO brake calliper

Edition 06/2009

SAF Service

Vehicle information

Manufacturer .....

Address .....

Body type .....

Chassis no.....

Year of manufacture .....

Registration date .....

Spare parts service for SAF axles and suspension systems

When ordering spare parts quote correct axle identification serial no., refer to the axle type plate.

Please enter the axle identification figures in the type plates shown below so that correct specifications are available when required.

Identification of axles when type plate not available.
Production No. of axle on RH side of axle tube.

Type plate (on the inside of the trailing arm or axle beam)

OTTO SAUER ACHSENFABRIK GMBH D-63856 BESSENBACH · GERMANY SAF	
Version **SKRB9022WI**	Serial No. **229 04 3 229**
Type **SBW2243-11S**	Ident No. **247 96 38 7 48 1**
Test Report **36110702**	Perm axle cap. stat. **9000** kg
	V max. **105** km/h
AN 1280397	SN 229043229

Introduction

This manual is intended for vehicle operators and workshop service engineers for use with the SAF axles and suspension units.

Always read the entire instructions before operating the trailer or proceeding maintenance and repair works. Failure to comply with these instructions without written permission from SAF will void the axle or suspension warranty.

The maintenance schedules are recommended by SAF, but as operating conditions and milages dictate frequency in servicing, a maintenance schedule to suit each individual operation must be established by the operator.

This manual does not cover all specifications manufactured by SAF. The information contained herein is general in nature. The parts shown in the illustrations are representative, they can vary in some details to your axle/suspension equipment.

Every precaution for accuracy has been taken in the preparation of this manual. However, SAF/Transport Specialties Limited do not accept responsibility for any omissions or errors that may appear, neither do they accept legal liability for any loss in connection with the information contained within this manual.

Personal Safety Precautions

Maintain workshop fitters safety precautions to avoid serious personal injury or loss of life. Only qualified staff are permitted to install, operate, maintain or repair brakes, axles and suspension components.

Warning!

On all suspensions a system failure may occur, this can cause the trailer chassis or axle to drop violently down. It is recommended that on air suspensions the system is completely deflated during repair works.

Before jacking up the axle or the trailer, check for solid ground, chock the wheels.
Always firmly secure the chassis and axles on strong support stands. This removes all imposed weight from the suspension and ensures that any work required underneath the trailer is carried out in safety.

For the latest SAF information, updates and technical bulletins, visit www.transpecs.co.nz

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The item numbers indicated are given only for identification and to distinguish between different versions.

Use the part numbers from the valid spare parts documents for identification of spare parts.

SAF axles and suspension units are subject to continuous further development; the data and drawings contained in the manual may therefore differ from the details given in the operating permit.

The contents of the manual do not constitute the basis for a legal claim.

The issue of this publication invalidates all earlier maintenance and repair manuals.

Note: We wish to think WABCO for providing various illustrations!

for SAF axles and suspension units

1. Instructions and tips for vehicle operation

In order to maintain the operation and road safety of the vehicle, the maintenance operations prescribed by SAF must be carried out regularly at the specified intervals (see "Service instructions").

Furthermore, ensure that

1.1 the disc brake is not overheated due to continuous braking action as irreparable damage to the surrounding components – in particular the wheel bearings – cannot be ruled out. This can impair the operational and road safety of the vehicle and represent a serious hazard for man and machine.

1.2 the compatibility of the brakes on the truck-trailer combination is checked. For reliable braking and uniform brake lining wear, the brake systems of the two vehicles must be matched to each other.

1.3 the parking brake is not applied immediately when the brakes are hot as the resulting different stress fields can damage the brake discs / drums.

1.4 the drum brakes are not overheated as this will result in a dangerous reduction in braking efficiency.

1.5 the maximum permissible axle loads and speeds are not exceeded.

1.6 the cargo is evenly distributed over the loading area and safely secured.

1.7 on vehicles with air suspension, the air bags are always fully inflated before moving the vehicle.

1.8 the prescribed wheel rims and tire sizes are employed.

1.9 The location and securing of the wheels is correctly maintained. Do not repaint the contact faces on either the wheels or hubs. On the contact surface of the wheel the maximum permissible coating thickness of 50 µm (primer plus paint) must not be exceeded.
All attachment faces must be clean with plain smooth surfaces free from any contamination of dirt, rust, grease, excessive paint and damage. In general refer to the wheel manufacturers recommendations, or consult your trailer builder for any wheel mounting details.

1.10 the tires are inflated to the prescribed inflation pressure.

1.11 your driving style is matched to the road and weather conditions.

1.12 chassis support legs are used when loading/unloading construction machinery.

1.13 the use of auxiliary trailer braking facilities (trailer underrun brake) is not permitted.

2. Vehicle safety

2.1 The daily check of the vehicle for road safety before moving the vehicle is the responsibility of the driver.

2.2 Modifications to the suspension and braking system are strictly forbidden.

2.3 Compliance with the specified permissible axle loads, observing the specifications in the vehicle operating manual, vehicle inspection intervals and the regular maintenance intervals is the responsibility of the vehicle owner.

2.4 We strongly recommend using only SAF approved replacement and spare parts which are covered by SAF product liability. These products have been thoroughly tested by SAF for safety, functionality and suitability. Usage of these parts guarantees not only safety on the roads but satisfies the legal operational requirements. SAF is not in a position to judge whether those products from other companies represent a safety risk for SAF axles and systems.

3. Warranty

Refer to Transpecs Warranty Handbook.

4. Service and spare parts

A close-knit service network of SAF partner companies is at your disposal for technical advice on SAF axles and suspension systems as well as for supplying approved SAF spare parts .

In case of repair, we strongly recommend using only SAF original parts for those reasons mentioned in point 2.4

SAF axles and suspension units are subject to continuous further development; the data and drawings contained in the manual may therefore differ from the details given in the operating permit.

SAF Service Schedule - SKRS/RZ 9019W

These are minimum requirements, operators must implement a service schedule to suit their specific requirements

Service Schedule				Whichever occurs first	After First 5,000km or	Periodic check		
				Mileage intervals >		every 30000 km	every 120000 km	
				Time intervals >	after first month	every 3 months	every 12 months	Comments
Mechanical check				✓/✗				
Attention: Torque check wheel nuts after the first 50 km and 150 km (repeat after every wheel removal). Follow a prescribed wheel nut torque procedure.					●	●		
Torque check all nuts and bolts to recommended setting								
Intra/Modul	Shock absorber bolts	400Nm			●		●	
Intra/Modul	Pivot bolts	1200Nm			●		●	
All axles	Wheel nuts	600Nm			●	●	●	Minimum Requirement
All axles	Hub nut	900Nm			●		●	
Intra	Air spring mounting nuts	Plastic base 20Nm Steel base 80Nm			●		●	
Modular	Air spring screws	Plastic base 20Nm Steel base 80Nm			●		●	
Modular	U Bolts	580Nm			●		●	
Modular	Air spring mounting plate	180Nm			●		●	
Check wheel bearings for noise and play. Hub end-float adjustment not possible, carry out hub service checks if required. Max axial play 2.5mm					●	●		
Pack wheel bearings with fresh grease after 500,000 km or 48 months, whichever comes first. Check condition of taper roller bearings and replace if necessary.								
Remove hubcaps and check for lubricant leakage.					●	●		
Check brake caliper for adjustment, remove pads and ensure slides are free. Clean out dust and inspect all boots for holes.							●	
Remove hub from spindle and add anti seize compound.								Every Reline
Check Truck and Trailer Compatability (Brake Balance) Max Lead 0.14bar					●		●	
Visual and safety inspection								
Components found to be worn down to their wear limits must be renewed								
Inspect the brake caliper guide system. Check for free movement and sliding action.					●	●		
Brake caliper, inspect rubber boots for cracks and damage. Check adjuster cap for correct seating.					●	●		
Inspect the brake pad thickness at regular intervals (e.g. whenever tyre pressure is checked) but at least every 3 months.					●	●		
Inspect the brake disc for cracks.						●		
Inspect suspension components for correct fastener connections, wear, leakage, corrosion, distortion, damage.					●	●		
Check hanger brackets, inspect the pivot bolts and shock absorber bolts with recommended torque setting.					●	●		
Inspect suspension for correct ride height setting, readjust if required.					●	●		
General inspection								
Check brake efficiency and application.					●	●		
Check air springs for damage or cracks.					●	●		
Ensure all ABS sensors fitted are aligned and cabling is in good condition.					●	●		
Check for air leaks.					●	●		
All air line connections are in good condition .					●	●		
All piping is secured and no signs of chaffing.					●	●		
Brake chamber blanking grommets are removed from the correct locations.					●	●		
Shock absorbers fitted correctly.					●	●		

Torque specifications:Refer SAF General Operating and Service Manual or visit www.transpecs.co.nz, choose technical to download PDF file.

Special service conditions

Vehicles with Aluminium Hangers or Steer Axles please refer to separate service instructions on these items

Vehicles with long standing periods: **service at specified time intervals**

Vehicles used under extreme conditions: **shorten the service interval by 1/2**

e.g. Forestry, construction site operation, multi-shift operation, offroad, regular river fording, construction site & multi shift operations.

Warranty claims will only be accepted as long as the operating and maintenance instructions have been complied with and only genuine SAF replacement spare parts have been used

SAF Service Report

Complaint*: -

Customer / Contact Person* -- Tel:* -- Transpecs Customer No -	**Report No.** **W**
Customer Order Number* ---	Date* - / - /

Vehicle Manufacturer* -	Registration No*. --	Chassis No*.
Date of Registration*	Mileage* --	SAF axle type* -- Disc / Drum*--
Suspension type* INTRADISC ☐ / Modular ☐ / Mechanical ☐ / Other ☐		Ride Height
Serial No. 1st Axle* --	Serial No. 2nd Axle --	
Serial No. 3nd Axle --	Serial No. 4th Axle --	
Garage/Repairer* -- Contact: -- Tel*: ---	Date of Repair	Invoice No. --

Tick approprite box*:

Vehicle type			Position on vehicle			Body type				
	☐	 ☐		Left	Right	Front "B"	☐	Rear B	☐	LSV Yes ☐ / No ☐
	☐	 ☐	1st Axle	☐	☐	Tipper	☐	Tanker	☐	EBS: Yes ☐ / No ☐
	☐	 ☐	2nd Axle	☐	☐	Stock	☐	Low Loader	☐	ABS: Yes ☐ / No ☐
	☐	☐	3nd Axle	☐	☐	Flatdeck	☐	Curtainsider	☐	Tyre Size: x
Other	☐	☐	4th Axle	☐	☐	Container	☐		☐	☐ Single / Dual ☐

Tractor				
Manufacturer:	--	Type:	--	EBS
Registration date:		Km:	--	Yes ☐ No ☐

Loaded Truck and Trailer compatibility completed:	Yes ☐	No ☐	Copy invoice encl: Yes / No
Carried out by (W/Shop):	--	Date:	KMS --
Trailer Last Service	Date:	Kms: --	--
Carried out by (W/Shop):	-		Copy invoice encl: Yes / No

Important:

Stage One: All items/boxes marked * must be completed in full and returned to Transpecs before any replacement parts can be dispatched.
Stage Two: Labour invoices with a completed copy of this Report, to be returned to Transpecs within 5 days of the date of repair.
Stage Three All replacement parts subject to this claim required by Transpecs must be returned to within 14 days.
Failure to submit all the required information and parts will result in an invoice being raised to cover costs of replacement parts, labour, transportation and/or any other costs involved.

Fax Back To Transpecs 09-980-7348*

Return Completed form to Transpecs with invoices when repairs are completed

SK RZ 9019 W

with WABCO Disc Brake type PAN 19-1

Hub unit inspection

Hub end-float setting. Lubricant

Hub end-float adjustment is not required. Pack wheel bearing with fresh grease after 500 000km or 48 months, whichever comes first. Check condition of taper roller bearing and replace if necessary.

Do not dismantle the hub bearing assembly, unless carrying out a regreasing. Inspect the Hub Unit at any brake disc replacement.

Check for excessive grease leakage and any abnormal noises whilst rotating the hub.

When replacing brake pads inspect the rubber boot seals of the calliper guide pins and the tappet seals.

Never use high-pressure cleaners or cleaning fluids on the brake disc or Hub Unit.

Clean stub axle of any old grease and apply fresh SAF fitting paste.

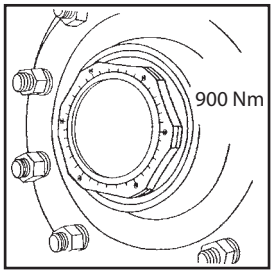
Lubricant specifications:

Grease for repairs is contained in every repair kit.

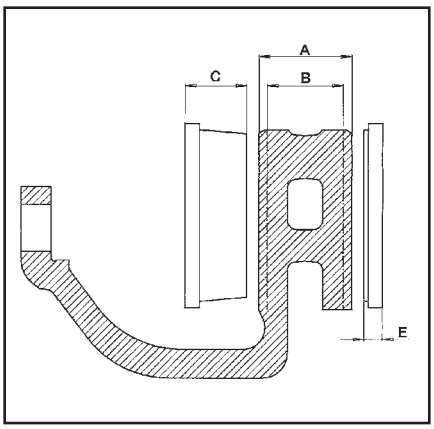
Stub axle:

SAF fitting paste	Part No. 5 387 0015 06	600g
	5 387 0021 01	1kg

Tighten Hub Nut



On left-hand side in direction of travel:
Left-hand thread
On right-hand side in direction of travel:
Right-hand thread
Tightening torque to 900 Nm. Each hub unit must be rotated smoothly at least twice while tightening the nut.
Marking of the nuts with left-hand thread: Milled groove on outside of hexagon.



NOTE!
Failure to observe these instructions could result in a road traffic accident. Worn brake linings or excessively worn brake discs result in a reduction in the braking efficiency or in a complete failure of the brake system.

Maximum wear limits

Brake Rotor			Brake Pad	
Diameter (mm)	„A" new (mm)	„B" max. wear limit (mm)	„C" new (mm)	„E" max. wear limit (mm)
370	45	37	30	11

Brake pads, use only original SAF spare parts for replacement.

Tightening torque in Nm

Attention! Bolts must not be oiled!

Bolt assembly's	Pos.-No.	SK RZ 9019 W
Brake chamber / spring brake chamber 2 hex. nuts M16x1.5		210
Guide pin bolts on brake calliper	70 80	340 ± 20
Brake calliper mounting on axle M16x1.5x55	56 56.1	290
Pad retainer clamp	63.1 63.2	30 ± 15

Assembly tools	SAF Part No.
Hub nut socket	1 012 0024 00
Hub puller	4 434 3822 00
Lever for hub cap	1 434 1041 00
Tool box WABCO	3 434 3328 00

Bolt / Nut torque values

The following tightening torques are only valid if no other values are given in the axle maintenance chart.

Torque wrenches settings, impact wrench not permissible.

Thread	W.A.F.	Material 8.8	10.9	12.9
M 8	W.A.F. 13	25	35	41
M 8 × 1		27	38	45
M 10	W.A.F. 17 / 16	49	69	83
M 10 × 1		52	73	88
M 12	W.A.F. 19 / 18	86	120	145
M 12 × 15		90	125	150
M 14	W.A.F. 22 / 21	135	190	230
M 14 × 1.5		150	210	250
M 16	W.A.F. 24	210	300	355
M 16 × 1.5		225	315	380
M 18	W.A.F. 27	300	405	485
M 18 × 1.5		325	460	550
M 20	W.A.F. 30	410	580	690
M 20 x 1.5		460	640	770
M 22	W.A.F. 32	550	780	930
M 22 × 1.5		610	860	1050
M 24	W.A.F. 36	710	1000	1200
M 24 × 2		780	1100	1300
M 27	W.A.F. 41	1050	1500	1800
M 27 × 2		1150	1600	1950
M 30	W.A.F. 46	1450	2000	2400
M 30 × 2		1600	2250	2700
M 36 × 2	W.A.F. 55	2450	3450	4150

Wheel fixing:
Wheels see appropriate axle maintenance chart.

Axle SK RS / RZ 9019

Hub Nut

L/H side direction of travel - L/H thread - Grooved hub nut and Spindle

R/H side direction of travel - R/H thread - Axle serial number on spindle

When installing the hub unit pre tighten to 200Nm, then a final turn of a further 30 degrees whilst rotating the hub at least five times	**200 Nm + 15 Deg**
In service hub not torque check whilst rotating the hub twice	**900 Nm**
Brake Caliper mounting bolt M16	**290 Nm**
Guide/Slide Pin bolts M16	**290 Nm**
Wheel Nuts M22	**600 Nm**

Modular Suspension

Pivot Clamping Bolt Assy M30

Pretighten to **400 Nm +**	**400 Nm**
Final tightening torque **120 Degrees (2 flats of the nut)**	**+ 120º**
Shock Absorber Nuts M24	**400 Nm**
U/Bolts for Trailing Arms M22 (Diagonally in three Stages)	**650 Nm**
Air Spring Mounting Plate M20	**180 Nm**
Air Spring Upper Nut M12	**40 Nm**
Air Spring Self Tapping Bolt (Plastic Plunger Piston)	**20 Nm**
Air Spring Bolt (Steel Plunger Piston)	**80 Nm**

Intradisc Dual

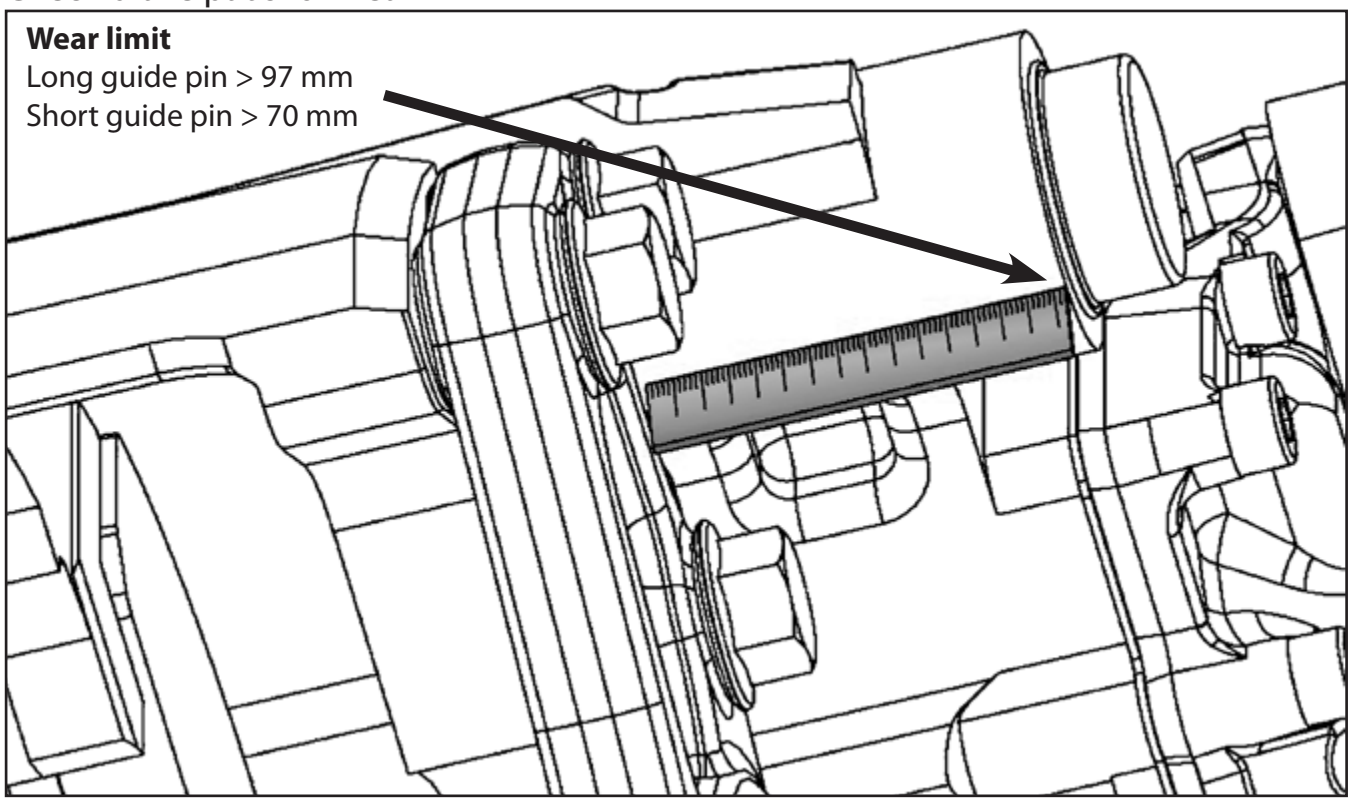
Pivot Clamping Bolt Assy M30

Pretighten to **400 Nm**		**400 Nm**
Final tightening torque **120 Degrees (2 flats of the nut)**		**120º**
In service checking torque		**1200 Nm**
Shock Absorber Nuts M20	Nut Contact Surface Dry	**600 Nm**
Aluminium Hanger Brackets	first check after 500km, further check after every 6 months	
Pivot eye bolt	Inspection torque	**1200 Nm**
Shock absorber bolt	Inspection torque	**600 Nm**
Air Spring Top Nut M12		**40 Nm**
Air Spring Plunger Bolts M16	Plastic Plunger Piston	**80 Nm**
	Steel Plunger Piston	**180 Nm**

SK RZ 9019 W

with WABCO Disc Brake type PAN 19-1

Check brake pads for wear



Check wear limit of brake pads and brake disc replace if necessary.
When distance on long guide pin is exceeding 97 mm or on short guide pin exceeding 70 mm.

Correct Shock Absorber Fitment

Bolt Kit 3 341 2803 10

Collared bolt M20×1.5×120 -10.9
4 343 2803 10
- dacromet coated-

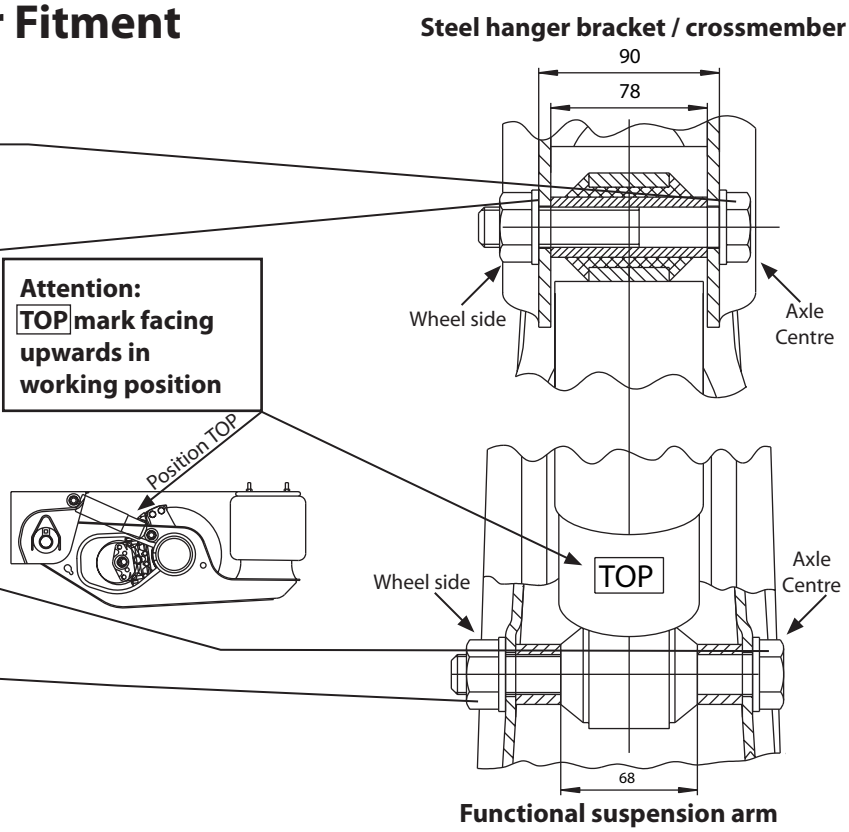
Collared nut M20×1.5 - 10
4 247 4044 10
Tightening torque:
Contact surfaces greased: 500Nm
Contact surfaces dry: 600Nm

Attention:
TOP mark facing upwards in working position

Bolt Kit 3 341 2802 10

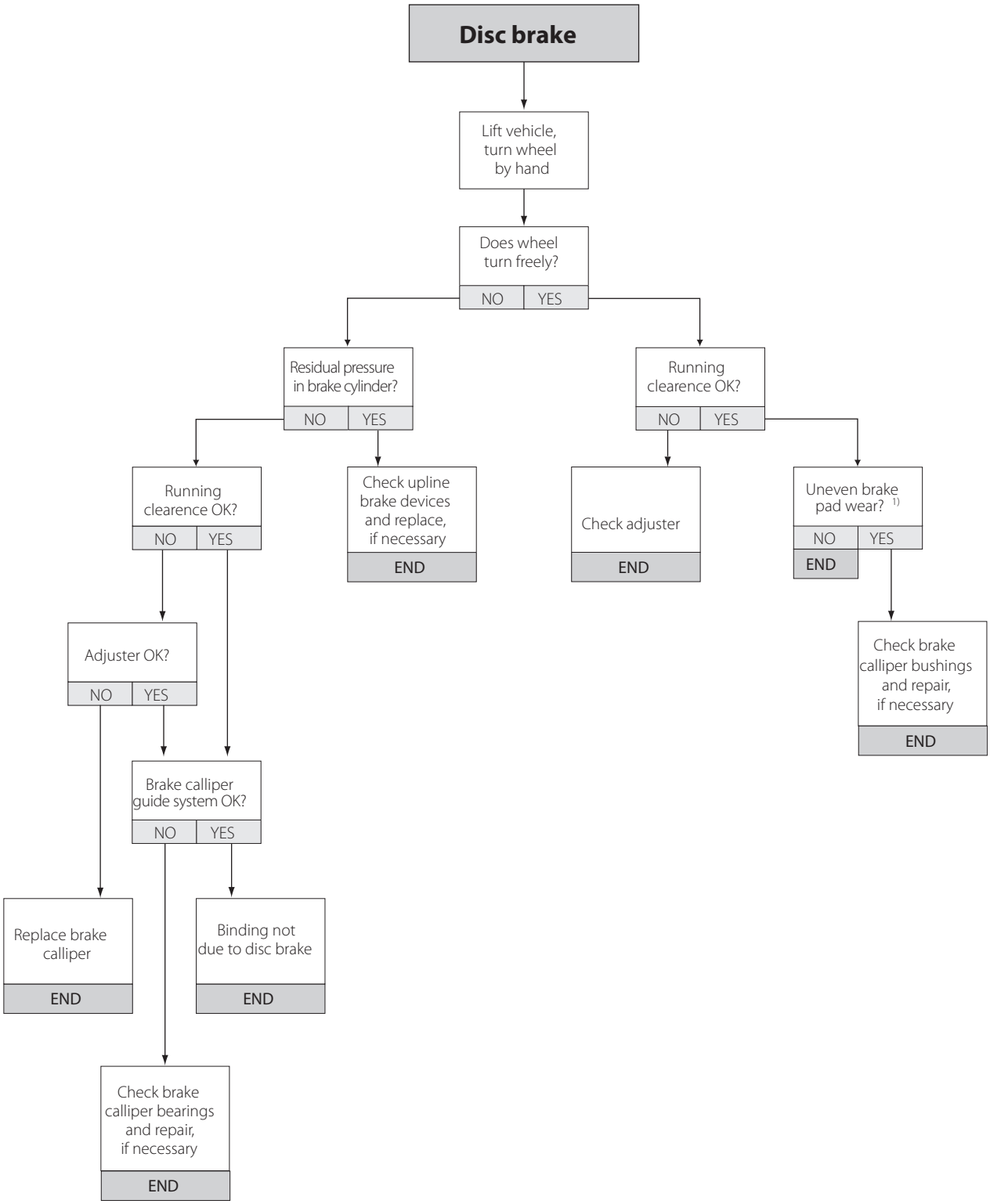
Collared bolt M20×1.5×150 -10.9
4 343 2802 10
- dacromet coated-

Collared nut M20×1.5 - 10
4 247 4044 10
Tightening torque:
Contact surfaces greased: 500Nm
Contact surfaces dry: 600Nm



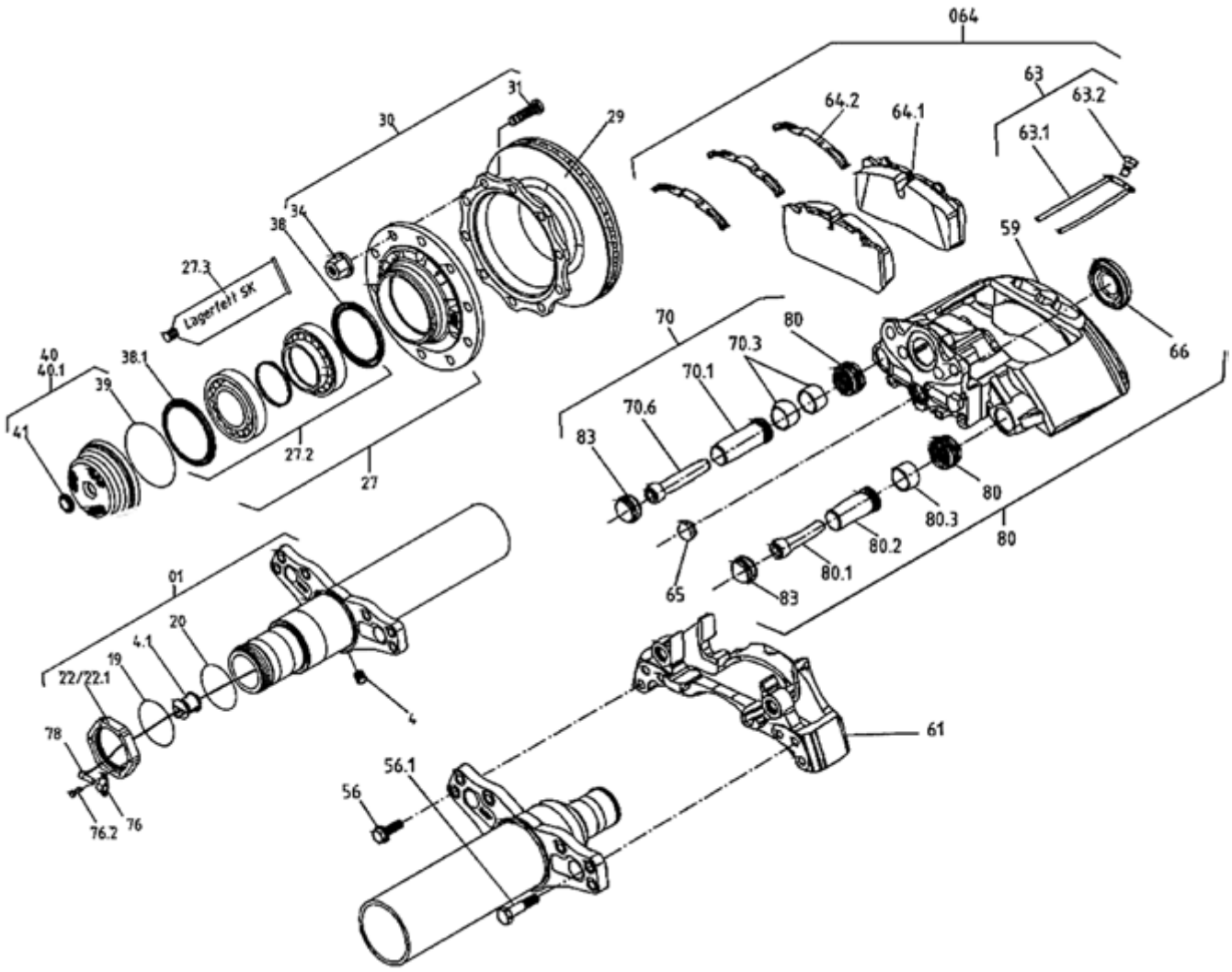
Brake test

Fault-finding chart



[1] Difference between wear of inboard and outboard pad, and diagonal wear ≤ 5 mm.

SK RS/RZ 9019W Axle - (Wabco Caliper)



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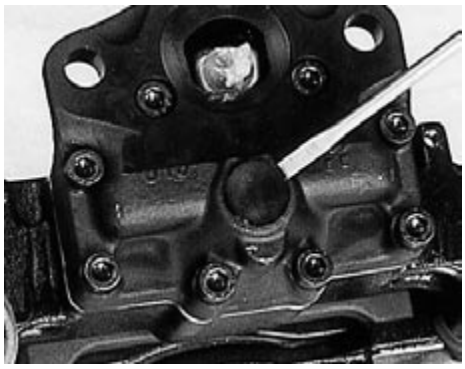
QUALITY ON THE MOVE

Item	Part Number	Qty	Description	Notes / Alt no.
19	4 315 0052 00	2	Axle Nut Lock Oring	
20	4 315 0056 00	2	Axle Spindle Oring	
22	1 011 0070 00	1	R/H Axle Nut M120x2/SW140	
22.1	1 011 0071 00	1	L/H Axle Nut M120x2/SW140	
27	3 307 3026 00	2	Hub and Bearing Assy Dual Alloy Wheels	8 stud 275PCD
27	3 307 3033 00	2	Hub and Bearing Assy Dual Alloy Wheels	10 stud 285PCD
27.2	**3 434 3012 00**	**2**	**Bearing and Seal Kit**	
27.3	**5 387 0011 05**	**2**	**Hub Grease Pack**	
29	**4 079 0004 00**	**2**	**Disc Brake Rotor 22mm Hole**	Sleeved nut - 8 stud 275PCD
29	**4 079 0014 00**	**2**	**Disc Brake Rotor 27mm Hole**	8 stud 275PCD
29	**4 079 0012 00**	**2**	**Disc Brake Rotor**	10 stud 285PCD
31	1 303 1075 11	16/20	Wheel Bolt	
	1 303 1112 10	16/20	Wheel Bolt 112mm	
	1 095 1057 00	16/20	Wheel Bolt Spacer (used with 1 303 1112 10 stud)	
	1 303 1125 10	16/20	Wheel Bolt 112mm (stepped shoulder)	
34	24738/ISO	16/20	Wheel Nut	
34	B5781/32	16/20	Wheel Nut Dual Alloy (Sleeved)	
38	4 373 0043 01	2	Inner Hub Seal	
38.1	4 373 0044 01	2	Outer hub Seal	
	3 434 3014 01	**2**	**Hub Seal Kit**	(20, 27.3, 38, 38.1)
39	4 315 0054 00	2	Hub Cap Oring	
40	3 304 0092 00	2	Hub Cap	
40	3 304 0092 20	2	Chrome Hub Cap	
	1 094 0037 00	**1**	**Hubo Mount Washer**	
41	4 337 2026 00	2	Protection Plug	
56	4 343 2914 10	10	Caliper Mount Bolt M16	
56.1	4 375 1004 10	2	Caliper Mount Bolt	
59	3 080 0032 00	1	R/H WABCO Brake Caliper	PAN19-1RH
60	3 080 0033 00	1	L/H WABCO Brake Caliper	PAN19-1LH
64	3 057 0080 00	**1**	**Brake Pad Set**	**12/999/737**
70	**3 434 3827 01**	**2**	**Tappet and Guide Pin kit**	12/999/738 (65,66,70,80)
76	4 189 0051 00	2	ABS Sensor Mount Bracket	
76.2	4 343 2067 00	4	ABS Sensor Mount Screw	
78	4 029 1042 00	2	ABS Sensor	441 032 579 0
Tools				
	PWI	1	Pad Wear Indicator	
	1 012 0024 00	1	Hub Nut Socket	
	4 434 3822 00	1	Wheel and Hub Puller	
	3/434/3328/00	1	Wabco Caliper Tool Kit	
	5/387/0021/01	1	SAF Fitting Paste - 1kg Tube	
	3/434/3327/00	1	SAF Calliper Adjuster Tool	

Transpecs
QUALITY ON THE MOVE



Self-Adjuster check

Remove adjusting screw cap.

Caution!

Do not overload or damage the hexagon drive (8 mm) of the adjusting screw. Do not use an open-ended spanner.

Turn the adjusting screw clockwise using an 8 mm ring spanner.

Actuate the brakes 5 times (approx. 1 bar)

When the self-adjuster is functioning correctly the ring spanner must turn anti-clockwise.

Caution!

Ensure that there is sufficient room for the ring spanner to rotate freely during adjustment.

Keep your hands off from the spanner whilst actuating the brakes. Danger for serious personal injury.

Note:

As the number of rotation steps of the ring spanner increases, the turn angle or movement of the ring spanner must reduce.

If the spanner rotates as described above, the self-adjuster is functioning correctly.

If the following faults occur:

The adjusting screw or ring spanner
a) does not turn,
b) turns only with the first application of the brakes,
c) turns forward and then back again at each application of the brakes,

the self-adjuster is not functioning correctly and the brake calliper has to be replaced.

Remove the ring spanner.

Coat the adjusting screw cap with grease in the snap-fit area, then push on the cap and ensure that it is firmely seal tight fitted.

Inspect condition of adjusting screw cap for proper seal function to avoid water entry into the self-adjusting gear.

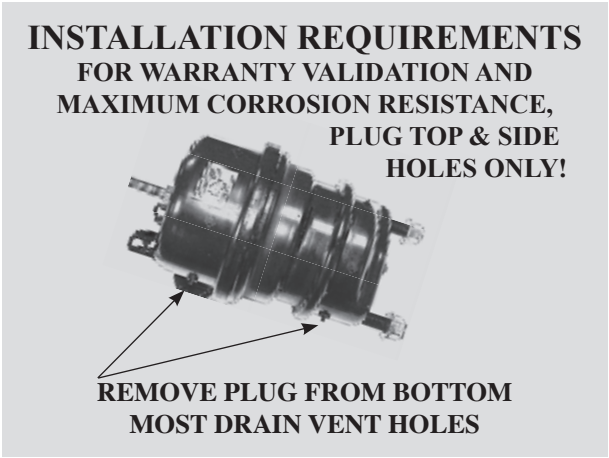
Replace adjusting screw cap if found worn or damaged.

Special notes

BRAKE BALANCE

To obtain maximum performance from the disc-brakes, brake balance between the truck and trailer must be carried out before going into service and again at 5000km service, and then every 12 months thereafter.
Maximum lead to trailer must not exceed 0.14 bar (2 psi).

Ensure that brake chamber plugs are removed from the bottom most drain holes.
Brake calipers are not covered by warranty for ingress of water or corrosion.



Only brake cylinders approved by the brake or axle manufacturer may by used.
Ensure the drainage holes are correctly located.

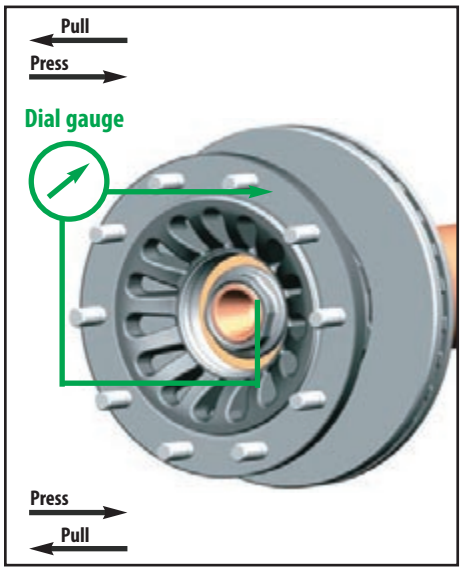
Painting instructions

During painting work, all rubber parts must be covered as otherwise the rubber will become brittle and thus be damaged.

We recommend that you carry out the wheel rock test and wheel bearing noise test and check the function of the seal system (grease leakage) in the event of signs of a malfunction.

At brake disc changes and in the event of damage, e.g. brake overheating, inspect the bearing for grease leakage.

For further instructions, refer to the error flow chart.



Example illustration

Wheel rock test

1. Raise the wheel. Do not remove the wheel!
2. Carefully remove the wheel cap.
3. Check the prescribed tightening torque of the axle nut (900 Nm).
4. Position the magnetic foot of the dial gauge as shown on the left.
5. By alternately pulling and pressing (first pull at the top and press at the bottom, then pull at the bottom and press at the top), rock the wheel and read off the travel on the dial gauge.
   Rotate the wheel several times before each measurement!

Note!
If a wheel rock of more than 0.25 mm (250 µm) is measured, the hub unit has to be serviced.

"OK"

Example illustration

Grease leak test

Increased grease leakage

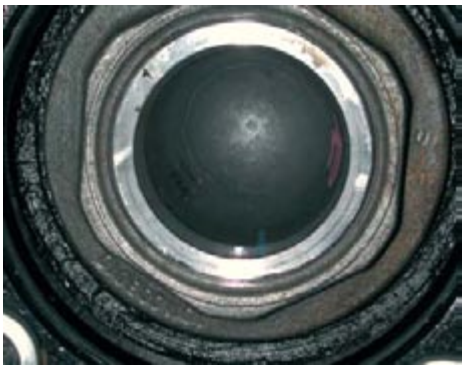
1. Indicator:
   If the wheel flange is covered with grease up to half the height when "dry".
2. Carefully remove the wheel cap.
3. If the complete inside of the wheel flange, i.e. inside of cover, axle nut, axle tube and seal are covered with grease, an increased grease leakage has occurred.

Note!
There may be a small amount of grease on the lower edge of the seal. This is normal and does not indicate grease leakage.

Seal not completely covered.

Normal operating condition (= after a prolonged period of operation).
Hub unit is OK.

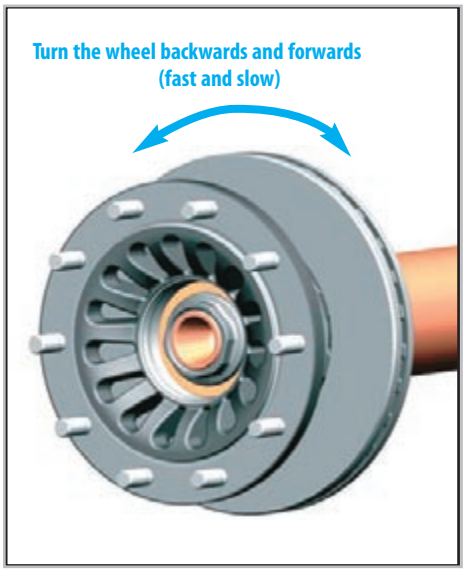
"Not OK"



Example illustration

Seal completely covered all over with tar-like grease.

Recommended measure:
Service the hub unit



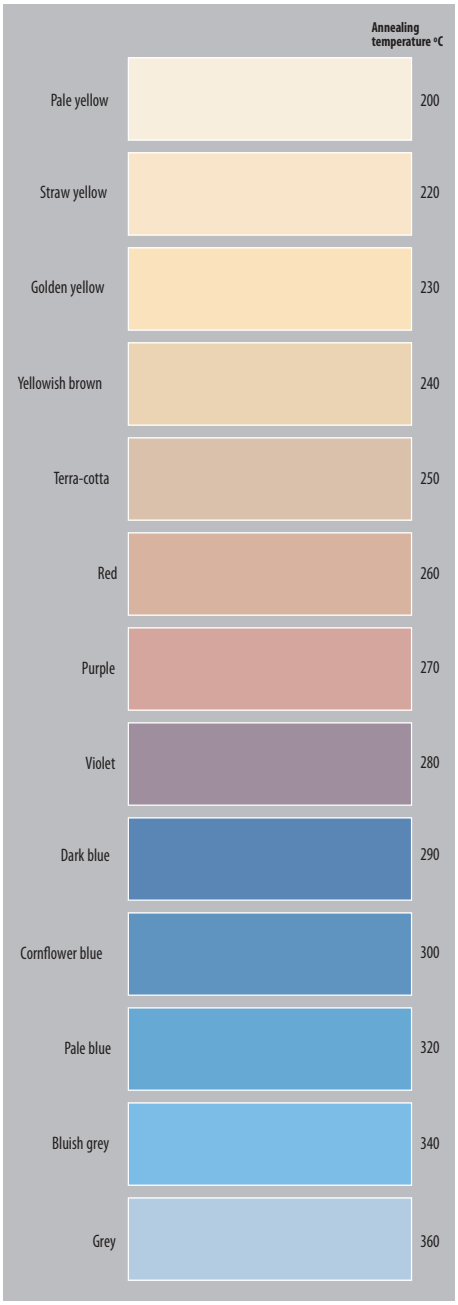
Wheel bearing noise test

1. Raise the wheel. Do not remove the wheel!
2. Carefully remove the wheel cap.
3. Check the prescribed tightening torque of the axle nut (900 Nm).
4. Turn the wheel in both directions (fast and slow).
5. If the bearing feels rough and / or a "grinding" noise is heard, the hub unit has to be serviced.

Note!
Noises can also be caused by the brakes. Before removing the hub unit, remove the brake pads and repeat the bearing noise test.

Note!
Measure the wheel rock.
Wheel rock up to 0.25 mm is admissible.

Annealing colours on the flange



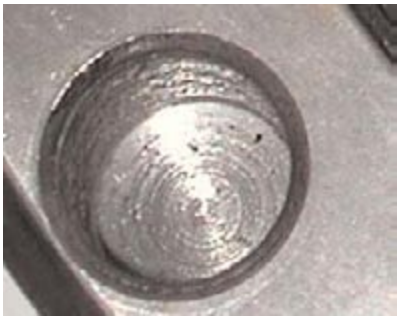
The discolouration is to be seen at the contact points to the brake disc and at the chamfer to the centring diameter or at the bottom of the blind holes (see figures). This discolouration is blue, red or occasionally tending to yellow.

Discolouration in this area can be caused by incorrect function/ operation of the brakes. The brake system must therefore be checked for tractor/trailer brake synchronisation and for adaption.

It must be assumed that particularly the grease or the bearing race and the seal have been subjected to thermal damage.

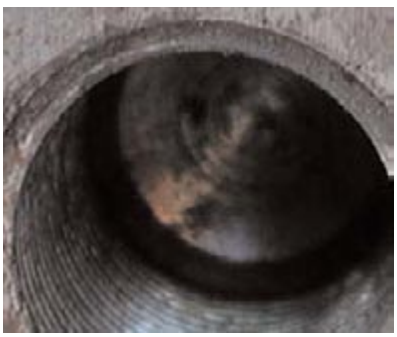
If large amounts of grease escape at the same time from the outer seal (under the cap), the hub unit must be serviced.

"OK"

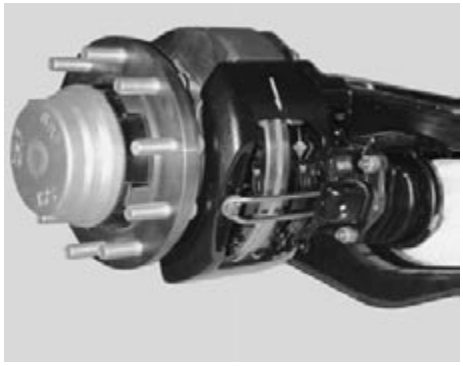


"Not OK"

"Not OK"



Recommended measure: Replace the hub unit.



Repairing the brakes

Removal of the brake calliper.

Park the vehicle on level, solid ground and chock the wheels to prevent the vehicle from rolling away.

Lift the axle using a jack.

Loosen the wheel nuts and remove the wheel.

Remove the adjusting screw cap.

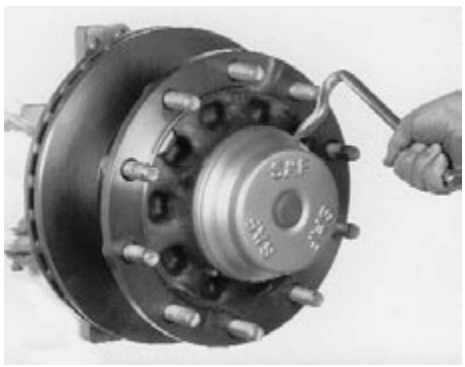
Turn the adjuster in anticlockwise direction up to the stop until it clicks 2–3 times.

Unbolt the diaphragm cylinder, if necessary.

Remove the pad retaining clamp.

Remove the brake pads.

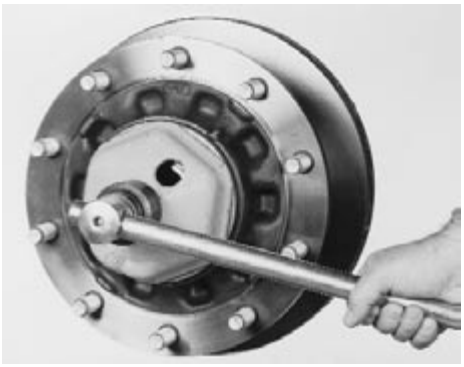
Unbolt the brake calliper.



Lever the hub cap off the hub unit by inserting a tyre lever into one of the recesses around the circumference of the hub cap.

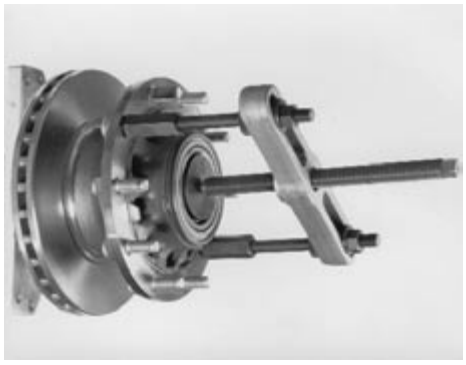
Press the ABS sensor completely out of the sensor mounting block and place inside the axle tube.

The sensor holder can remain on the axle nut.



Loosen the axle nut and unscrew from the stub axle.
Axle nut wrench: SAF Part No. 1 012 0024 00.

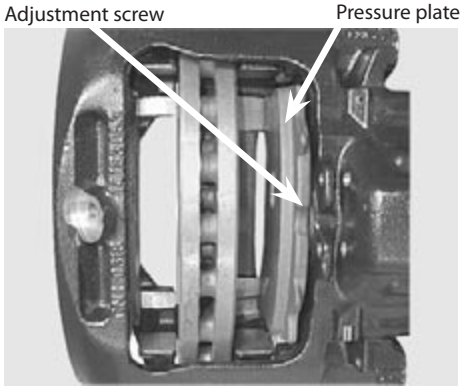
Note:
Axle nut: W.A.F. 140
On left-hand side of vehicle
(as seen in direction of forward travel) – **left-hand thread.**
Identification of axle nut with left-hand thread:
Milled groove on outside of hexagonal head.



The complete hub unit with brake disc can be easily pulled off the stub axle.

If the bearing inner races tilt on the stub shaft, the hub unit can be pulled off using a normal workshop puller or SAF Part No. 4 434 3822 00.

Note:
Do not disassemble the hub unit bearing assembly!
The wheel bearings have a long-life grease packing.
Grease change intervals, see chapter "Maintenance instructions".

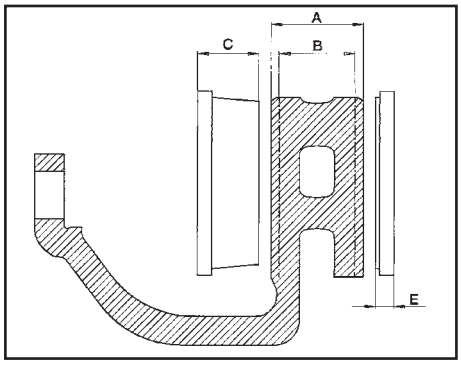


Check the brake calliper for free movement, and sliding action.

Back off the tappets on the adjuster until the boots are visible.

Perform a visual inspection of the boots and all seals.

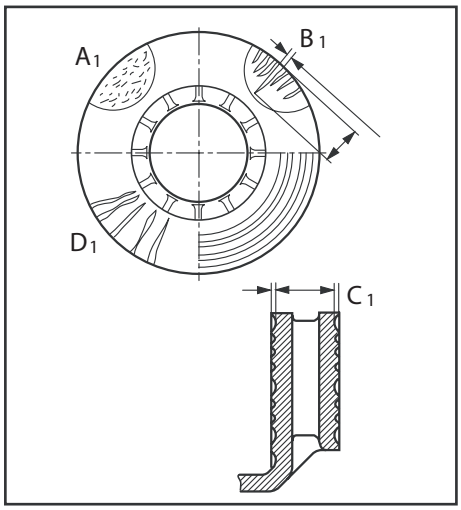
Screw in the tappets again completely.



Brake disc

See table in chapter "Maintenance instructions".

The brake disc may only be cleaned using a dry cleaning agent.



Inspecting the brake disc

Inspect the braking surface of the brake disc carefully for serviceability.

A_1 – Network-like cracks are permissible.

B_1 – Cracks up to max. 1.5 mm (width and depth) running towards the middle of the hub are permissible.

C_1 – Unevenness in the disc surface up to 1.5 mm is permissible.

D_1 – Cracks going right through the disc are not permissible.

Check the brake disc thickness and machine, if necessary. For safety reasons, the limit thickness for machining the brake discs is 39–40 mm.

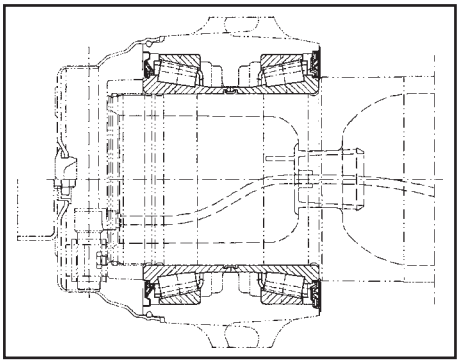
Max. wear limit, see table in chapter "Maintenance instructions".

Replacing the brake disc

To remove the brake disc from the hub unit, drive all the wheel bolts out of the hub unit using a hammer. Removal of the circlips is not necessary. Before reassembling wheel hub and brake disc, remove any corrosion from the contact surfaces.

Insert the wheel bolts at an angle from below and hammer into place (observe twist lock).

Draw the bolts completely into the hub unit using a wheel nut and an impact wrench.



Arrangement of wheel bearing assembly with seals

Repairing the wheel bearings

Changing the wheel bearing grease

As the operations are identical for both procedures, the descriptions are contained in the same chapter.

Wheel bearing kit

After 500,000 km or after 48 months' operation, the following 3 procedures are possible:

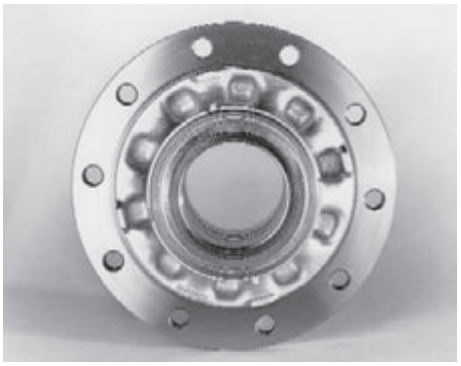
1) Inspection of the wheel bearing for further serviceability with grease change and replacement of the seal rings.
2) Replacement of the complete wheel bearing assembly with seals and long-life grease. The wheel hub can continue to be used.
3) Installation of a complete original compact wheel hub.

The wheel bearing has to be disassembled for the inspections; replace any parts which are worn or damaged.

The wheel bearings must be in a good and serviceable condition.

The outer races must still have a correct, secure seating in the wheel hub.

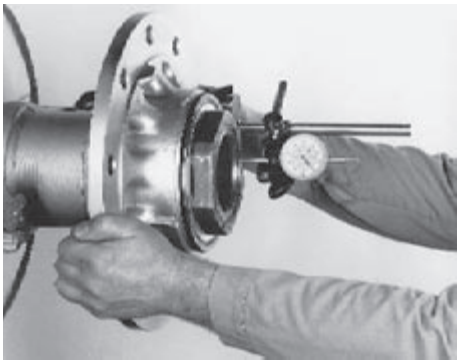
The wheel bearing must turn freely without noises.



Original compact hub

During assembly of the wheel bearing set, ensure absolute cleanliness of all the parts as even the slightest dirt can significantly reduce the service life of the wheel bearings.

Note:
Replacement of only one bearing is not permitted.

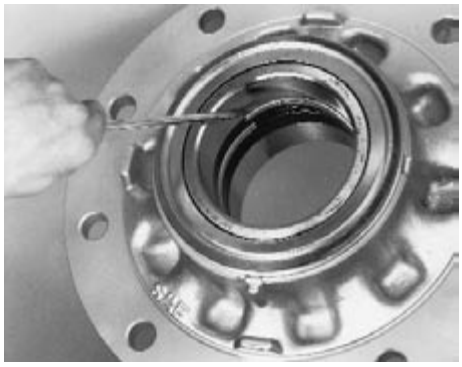


Always change the wheel bearings in pairs with the complete seal set and the prescribed grease packing.

The wheel bearing axial clearance must not exceed 0.25 mm.

If the permissible limit for the wheel bearing clearance of 0.25 mm is exceeded, the wheel bearing set or optionally, the bearing hub must be replaced.

Checking of the axial clearance should be expediently carried out when changing the brake disc.



Removing the wheel bearing assembly

Lever out the retaining ring using a screwdriver.

Place a drift against the joint of the two wheel bearings and drive the bearing inner races out of the wheel hub together with the seal rings.

Drive the bearing outer races out of the hub housing using a normal workshop drift.

Thoroughly clean the hub housing.

Installing the wheel bearing assembly

Drive both bearing outer races into the hub housing until they bottom.

Use installation tool, SAF Part No. 3 434 1043 00.

Pack the space between the bearing outer race and shoulder with long-life grease.

Coat the taper roller bearing with the remaining grease.

Distribute the grease supplied in the repair kit uniformly over both bearings and use up completely.

Place the bearing inner races into the hub.

Secure both bearing inner races with the retaining ring.

Pack the ring gap on the face side of the bearing with long-life grease.

Fit the seal rings.

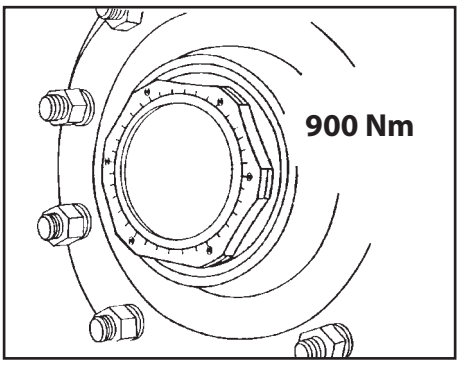
Press the seal rings into the hub on both sides using the installation tool, SAF Part No. 3 434 1043 00, until they are flush with the edge of the hub.

If the hubs are subsequently painted, ensure that the contact surface for the wheel is not painted.

Installing the Hub Unit with brake disc

Completely coat the wheel bearing seats on the stub shaft and in the Hub Unit with SAF fitting paste (SAF Part No. 5 387 0015 06).

See chapter "Maintenance instructions" for recommended media.

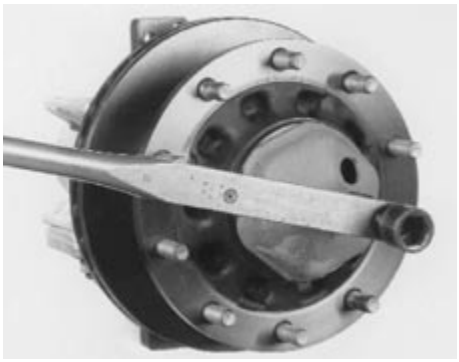


Replace the rear O-ring on the stub shaft.

Inspect the O-ring on the axle nut and replace, if necessary.

Push the Hub Unit brake disc assembly onto the stub axle.

Screw on the axle nut.



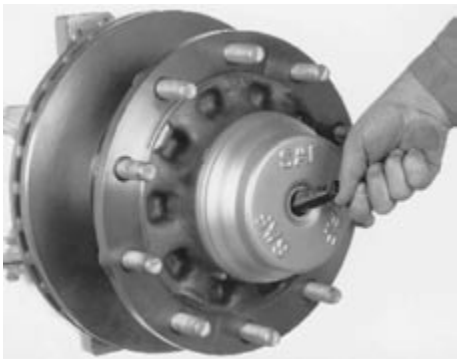
Axle nut W.A.F. 140:

On LH side of vehicle (as seen in direction of forward travel)
– LH thread.
Identification of axle nut with LH thread: Milled groove on outside of hexagonal head.

Tighten the axle nut.
Axle nut wrench: SAF Part No. 1 012 0024 00

Pre-tighten the axle nut to 900Nm whilst rotating the hub at least twice.

Loosen the axle nut again and repeat procedure.

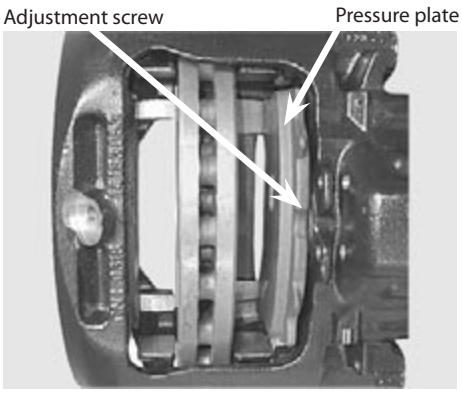


Completely coat the ABS sensor with copper paste and install in the sensor holder.

Inspect the O-ring on the Hub Unit for the snap fastening of the hub cap; replace, if necessary. Push on the hub cap and check that it is securely seated.

Remove the plug from the hub cap and push the ABS sensor until it is contacting the exciter ring. Insert the plug into the hub cap again.

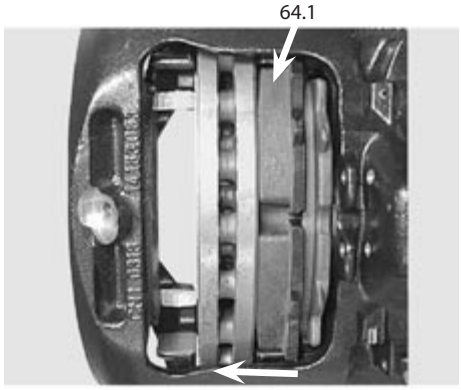
Measure the voltage output on the ABS sensor cable using a voltmeter (approx. 100mV) whilst rotating the hub.



Move the brake calliper so far so that there is enough distance between the brake disc on the actuation side to insert the brake lining.

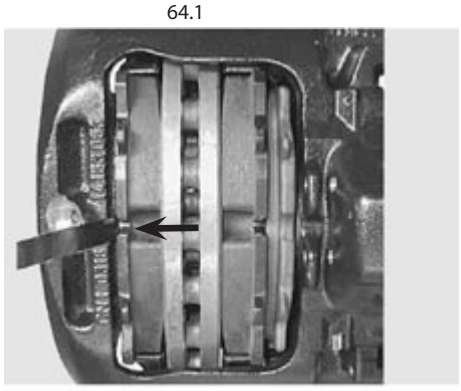
Insert the pressure plate into the brake mounting and push it against the adjustment screw.

Note!
The pressure plate must seat correctly in the brake mounting guide and the pin of the adjustment screw must be seated in the groove of the pressure plate, otherwise the correct functioning of the adjustment mechanism is endangered! Provision is made so that the adjustment screw can be turned until the pin sits correctly in the pressure plate groove. The protection cap must not be rotated during this action.



Inserting new brake linings 64.1 on the actuation pad.

Move the brake calliper in the direction of the rim until the actuation side of the brake lining 64.1 sits on the brake disc.

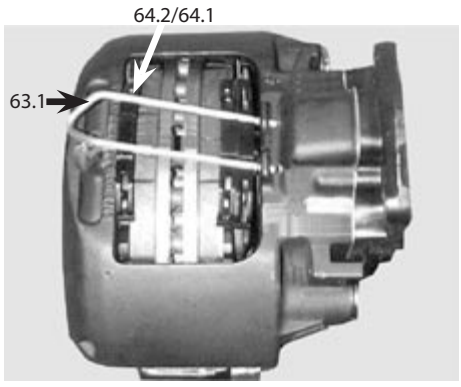


Inserting **new** brake linings 64.1 on the rim side.

With the help of a 1 mm thick feeler gauge (arrow) inserted between the rim side of the lining and the brake calliper, regulate the adjuster with a ring spanner until both brake linings sit on the brake disc.

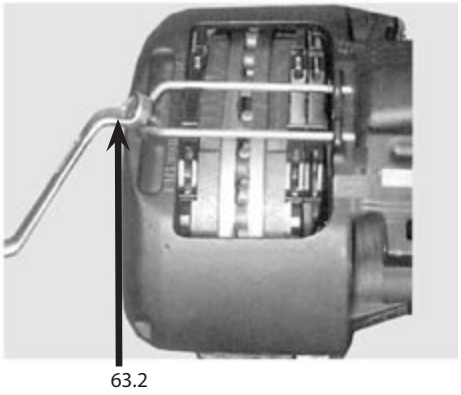
Attention!
Do not use excessive force on the corners of the adjuster.

Note!
Direction of rotation in regulating the adjuster is anti-clockwise. Do **not** assemble the lining retainer hoop until play has been adjusted.

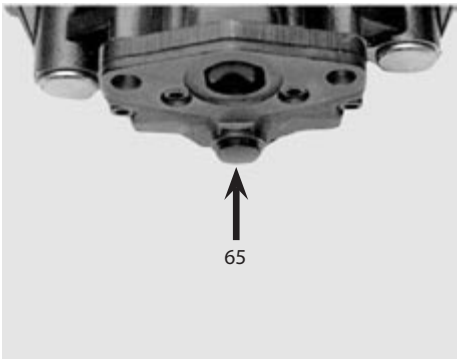


Setting **new** retainer springs 64.2 onto the brake linings 64.1 and pressure plate.

Push and depress the lining retainer hoop 63.1 in the opening of the brake calliper so that the radial lugs of the retainer spring seat in the hoop.

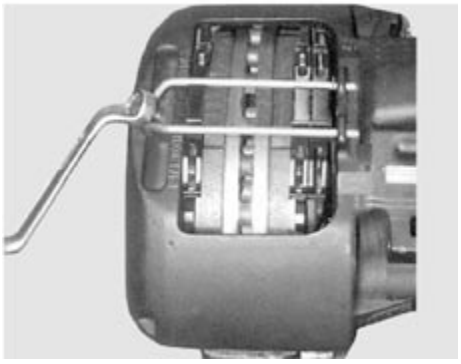


Affixing **new** hex. screw 63.2 with 30±15 using a spanner onto the brake calliper.



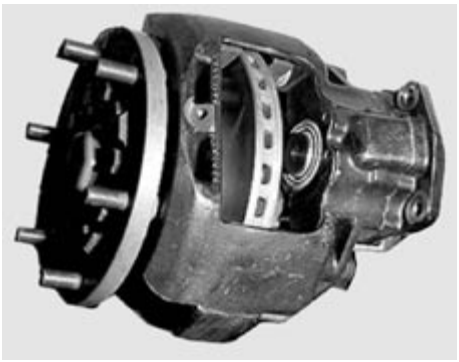
Push the **new** plug 65 into the opening of the brake calliper! Check the wheel hub for freedom of movement.

Note!
Check the brakes on a rolling road test station after completion of work.



Replacing of the tappet rubber boot seals

Dismantle brake linings and pressure plate.



Move brake calliper by hand towards the cylinder.

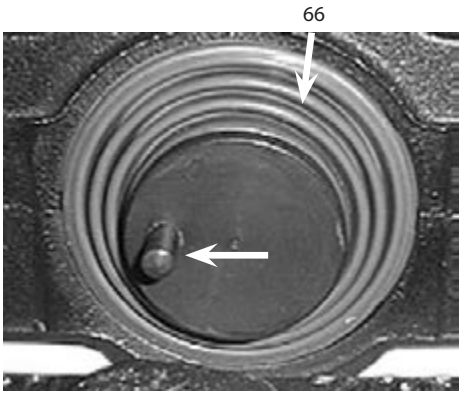
Pull out the protection cap 66 using a screwdriver from the brake calliper seating.

Check the thread on the adjuster screw.

Note! Lay the rim side brake lining in the lining cavity so that the adjuster cannot be screwed out of adjustment. After checking remove the linings again.

Secure the adjuster screw against turning (arrow) and screw out approx. 30mm anti-clockwise using a ring spanner on the hexagonals.

During this time check the thread for damage or corrosion.

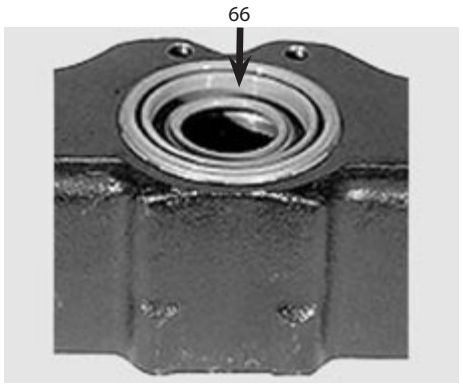


Note!

The protection cap 66 can be replaced if dirt or water is seen to be present over the seal seat of the brake calliper, or if the protection cap has been damaged immediately prior to servicing. Should parts be found to be corroded then the brake should be replaced in case of doubt.

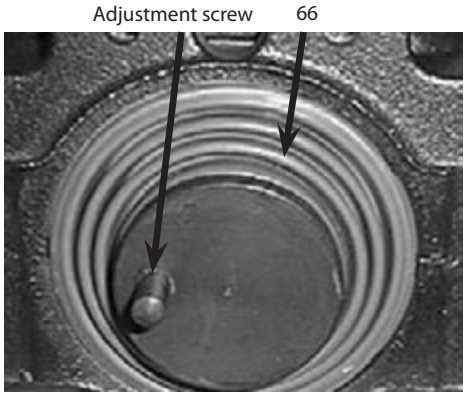
After checking, grease the thread and partly screw the adjuster clockwise again.

Clean the seating of the protection cap 66 in the brake calliper (arrow) (illustration without adjustment screw).



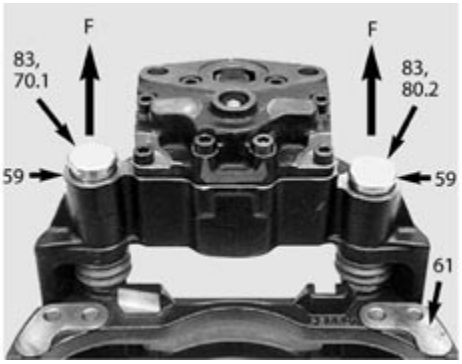
Push the **new** protection cap 66 over the adjuster.
Centralize the press-in tool over the protection cap 66 and insert the protection cap in its seat in the brake calliper 59.

(illustration without adjustment screw)



Insert the protection cap 66 into the adjustment screw seating.
Grease the rim lip before insertion.

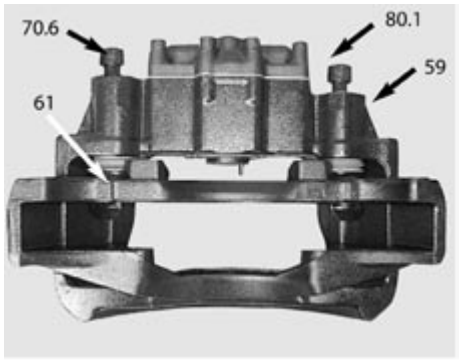
Note! Ensure an even and unwrinkled seating of the protection cap's rim lip in the groove of the adjustment screw.



Repairing the brake calliper bearing with "guide and seal kit"

Dismantle the brake calliper 59 from the brake mounting 61 and additionally remove the cap 83 of the guide pin 70.1/80.2 with a screwdriver from the housing 59.

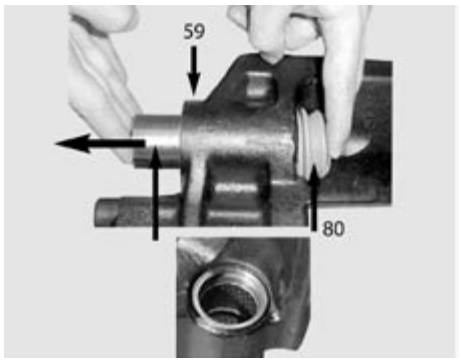
Note!
Do not damage the holes for the cap in the housing.



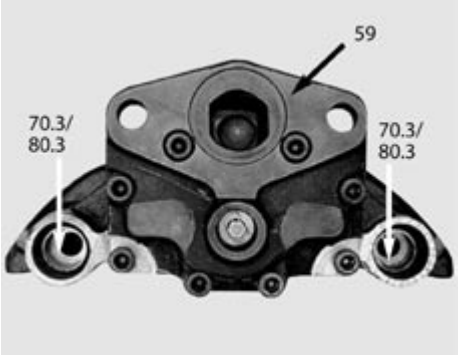
Loosen the screws 70.6/80.1 with a spanner. Remove the brake calliper 59 from the brake mounting 61.

Note!
Danger of trapping through loose brake calliper!

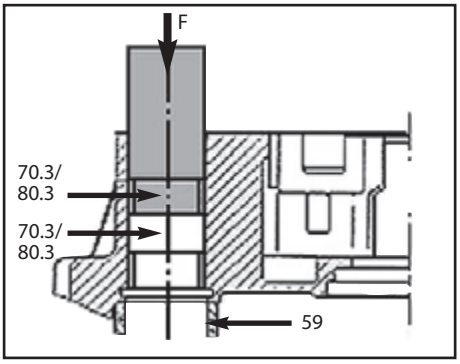
Clean contact surface (flush) on the brake mounting 61 to the guide pin.



Remove the guide pin 70.1/80.2 from the brake calliper 59, remove the protection cap 80 from the groove.

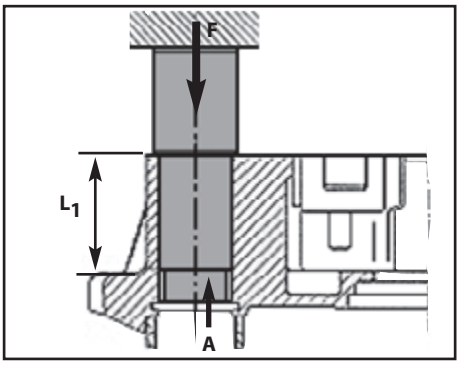


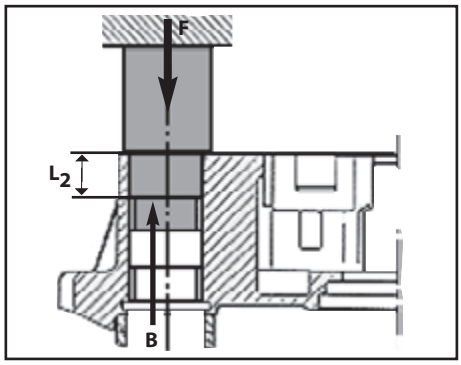
Lay the brake calliper 59 on a firm surface so that the cover opening of the brake calliper is uppermost in order to press out the bushes 70.3/80.3.



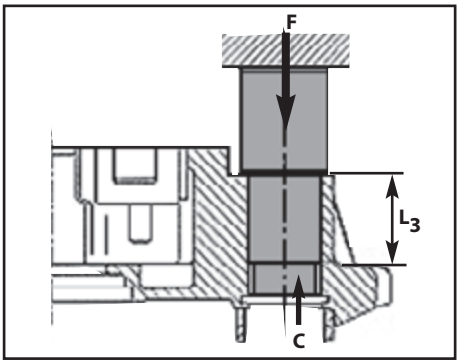
Press out the bushes 70.3/80.3 from the brake calliper using a press and mandrel.

Clean the holes in the brake calliper.





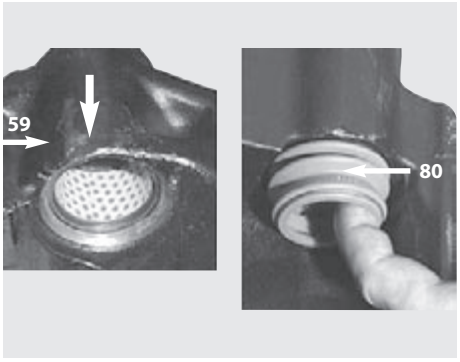
Press in two **new** bushes 70.3 and for the longer guide pin 70.1:
Firstly (A) the inner bush with mandrel (L_1 = 52.2 ± 0.2 mm), and finally (B) the outer bush with a mandrel
(L_2 = 13.2 ± 0.2 mm), in both cases press in until they meet the stop.
Grease sliding surfaces of the bushes and the space between them.



Press in a **new** bush 80.3 for the shorter guide pin 80.2.

Press in bush (C) with mandrel (L_3 = 38.7 ± 0.2 mm) until it meets the stop.

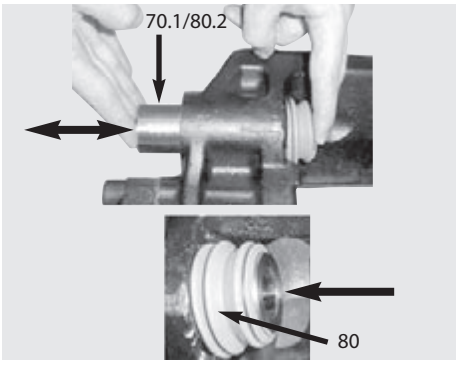
Grease sliding surfaces of the bush.



Insert the **new** protection cap 80 in the seat (arrow) of the brake calliper (59).

Note! Clean seating before insertion. For ease of insertion of the protection cap it is recommended to lightly grease the rim lip.

Note! Ensure an even and unwrinkled seating of the protection cap's rim lip in the groove of the brake calliper.



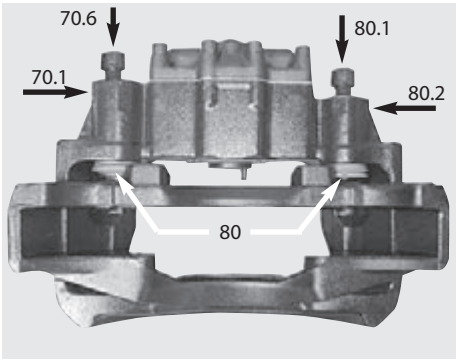
Grease the running surfaces for the guide pins 70.1/80.2 and the rim lip of the protection cap 80.

Insert the **new** guide pins from the direction of the cylinder into the brake calliper 59 and push the protection cap 80 against the seating of the guide pins 70.1/80.2.

Lightly move the guide pins backwards and forwards several times as illustrated in the sketch.

The longer guide pin 70.1 is the shoulder bolt and is fitted on the brake disc run in side. The shorter guide pin 80.2 is the play bolt and is fitted on the brake disc run out side.

Remove excessive grease. The flat surfaces of the guide pins to the brake mounting (arrow) must be free of grease!

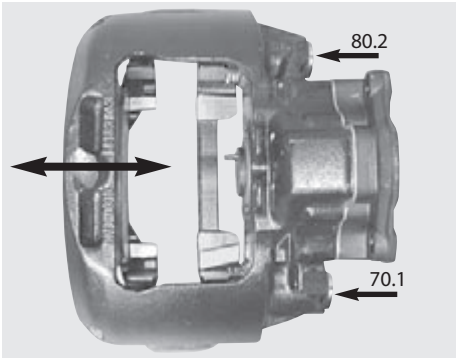


Seat the brake calliper 59 onto the brake mounting 61 and insert the fitted guide pins 70.1/80.2 flush.

Fit the new screws 70.6 (long for the shoulder bolt 70.1), 80.1 (short for the play bolt 80.2) through the previously fitted guide pins in the brake calliper 59 and screw the brake calliper to the brake mounting 61.

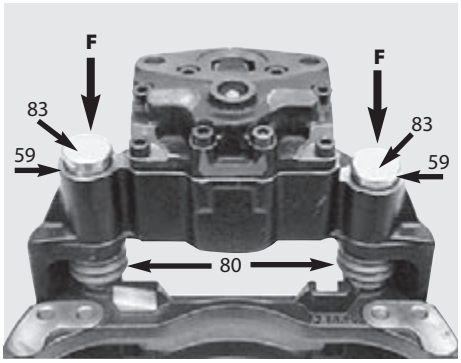
Tightening sequence: 1st screw 70.6 / 2nd screw 80.1

Note!
It must be ensured during tightening of the screws when assembling that the protection cap 80 is not damaged or rotated. First, screw tightly the slide fit longer guide pin 70.1 and then screw tightly the running fit shorter guide pin 80.2.
Should the guide pins 70.1/80.2 be loosened during maintenance work from the brake mounting 61, then these must be replaced with new screws 70.6/80.1 when re-assembling.



Move the brake calliper several times backwards and forwards over the guide pins 70.1/80.2. Ensure ease of movement.

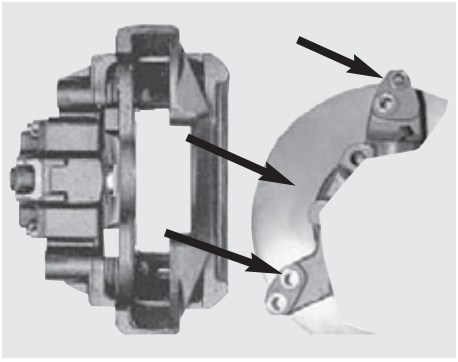
Note!
Do not squash the guide pins against the brake mounting!



Grease the holes for the cover plate 83 in the brake calliper 59.

Insert the **new** cover plate 83 into the holes of the brake calliper 59 and press home using a suitable tool.

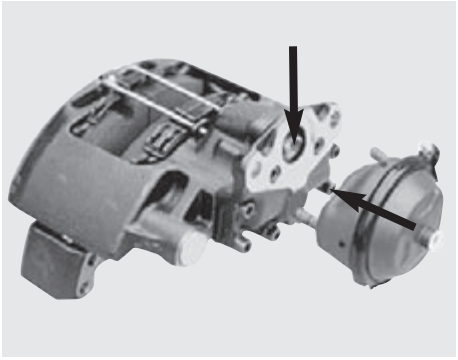
Note!
Avoid damaging the cover.



Fitting the brake calliper

Seat the brakes with brake mounting over the brake disc and fit to the axle.

Tightening sequence of the screws:
RH side clockwise
LH side anti-clockwise
Each time begin the sequence with the shoulder bolt (if applicable).
Position of shoulder bolt: In the direction of wheel rotation – the run out side of the outer corner of the flange.



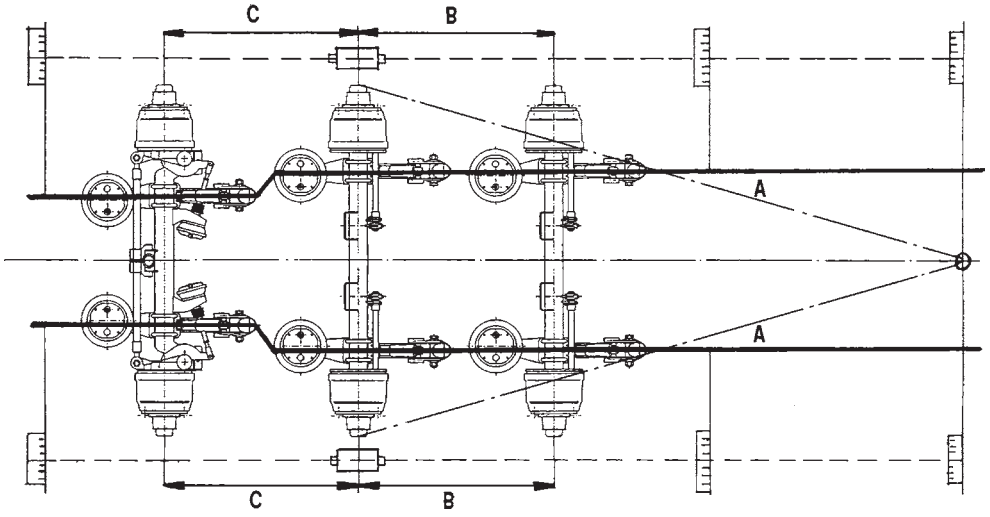
Replacing the brake cylinder

Before fitting the brake cylinder clean the sealing surface of the brake calliper and grease the bearing on the brake lever (arrow).

Set the brake cylinder onto the brake calliper and screw the nuts tightly with a spanner - torque to 210 Nm.

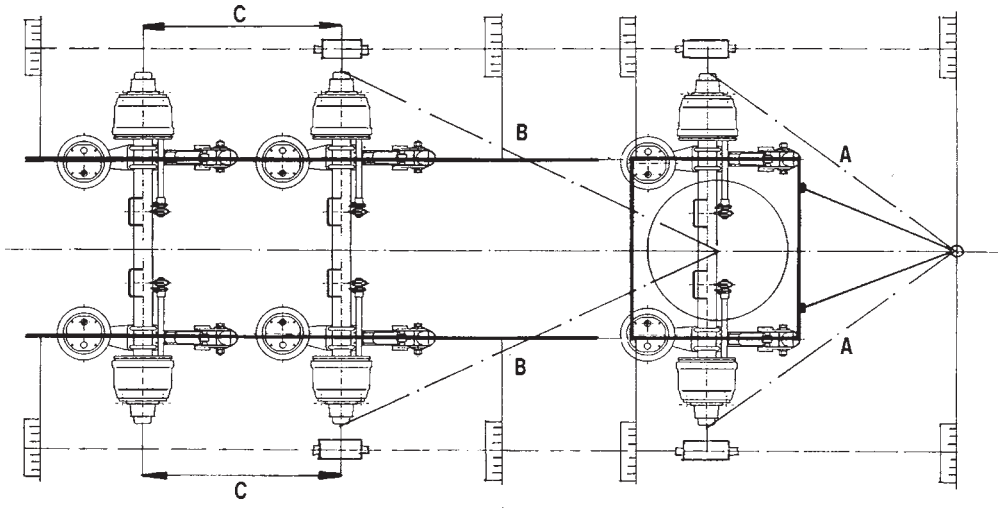
Note!
According to the respective fitting position, the lower drain holes on the bottom of the cylinder must be clear.

For axle alignment, the air suspension must be adjusted to the ride height specified by SAF.



Semi-trailers with self steering axle

Distance A, B, C max. permissible deviation 1.0 mm
Toe setting ± 12′ = ± 3.0 mm/m Camber ± 12′
Values apply to unloaded vehicle.
Air suspension must be in Ride Height for axle alignment check and re-adjustment works.
In the case of self steering axles the stabilizing chambers must be pressurised to 2.0 bar.
Total toe-in 4.0 mm/m.



Trailer

Distance A, B, C max. permissible deviation 1.0 mm
Toe setting ± 12′ = ± 3.0 mm/m Camber ± 12′
Values apply to unloaded vehicle.
Air suspension must be in Ride Height for axle alignment check and re-adjustment works.
The max. permissible deviation values for axle aligment are according to the tyre manufacture specifications.
To avoid excessive tyre wear we recommend having the alignment checked at regular intervals.
Deviations may be caused by:

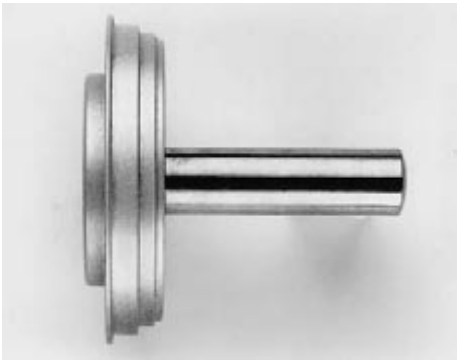
- loose U-bolts
- spring guide bearing wear
- deformation of axle assembly components due to improper use

The relevant reference point for alignment is the hub cap centre or stub axle centre.

1. WABCO tool box
Wabco Part No. 12/851/021
SAF Part No. 3/434/3328/00

2. Axle nut wrench W.A.F 140mm
SAF Part No. 1 012 0024 00

3. SAF ratchet wrench
SAF Part No. 3 434 3327 00



4. Wheel bearing installation drift
SAF Part No. 3 434 1043 00

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