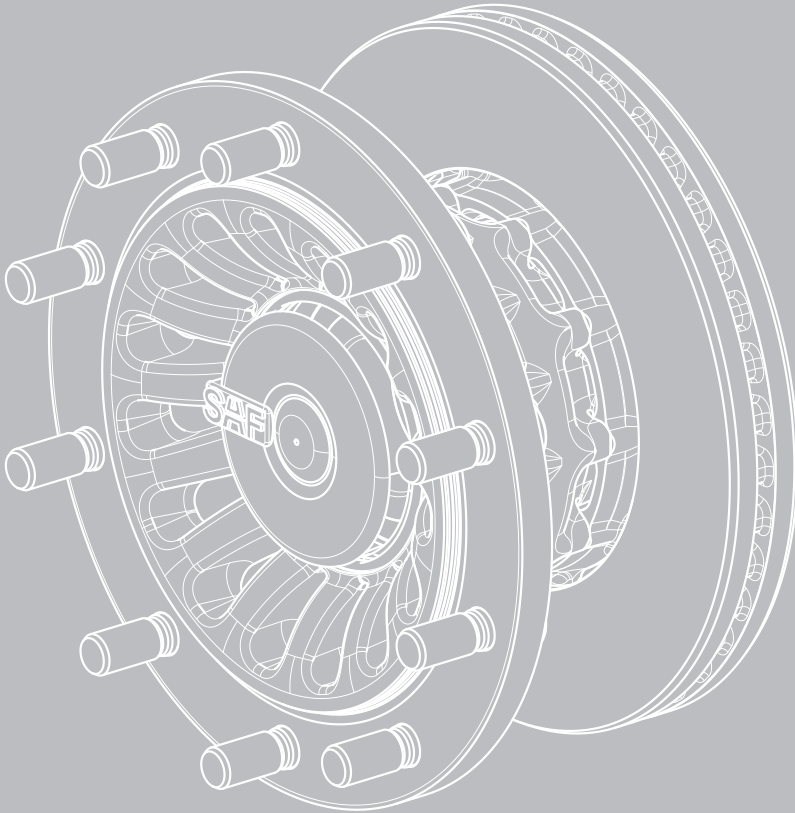


Operating manual

Air suspension systems and axles with disc brakes
Valid for axle types B / BI / SI / ZI



XL-AS11405OM-en-DE Rev B

Translation of the original operating manual

1.1 Dear customer,

This operating manual helps you to familiarise yourself with the products from SAF-HOLLAND with instructions for their proper use.

The operating manual contains important instructions on how to operate the product safely, properly and economically. Adherence to it helps prevent hazards, faults and reduce down-time and increase the reliability and service life of the product. Read the operating manual through carefully and follow the instructions accurately.

It must be ensured that all personnel with responsibility for performing tasks on the vehicle are able to consult the operating manual at all times.

The operating manual must be kept in the glove compartment in the driver's cabin of the towing vehicle at all times.

1.1 Copyright

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SAF-HOLLAND GmbH Hauptstrasse 26, 63856 Bessenbach, Germany

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- duplicated,
- distributed or
- in any other way disclosed.

Any breach or infringement will result in liability for damages.

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1 Axle identification

1.1 Identifying the axle

Please have the exact type designation of the product ready when ordering spare parts.

The 11-digit number (serial No.) can be found on the type plate.

SAF-HOLLAND GMBH D-63856 BESSENBACH · GERMANY		
Version B9-22K01	Serial No. 11 09 156 0020	
Type SBK2243-11S	Ident No. 347 96 21 7 49 01	
Test Report 36110303	Perm. axle cap stat. 9000 kg	
Made in Germany	V max. 105 km/h	
AN 3335528		SN 11091560020

AS-0027

Fig. 1 · · Type plate

1.2 Position of the type plate

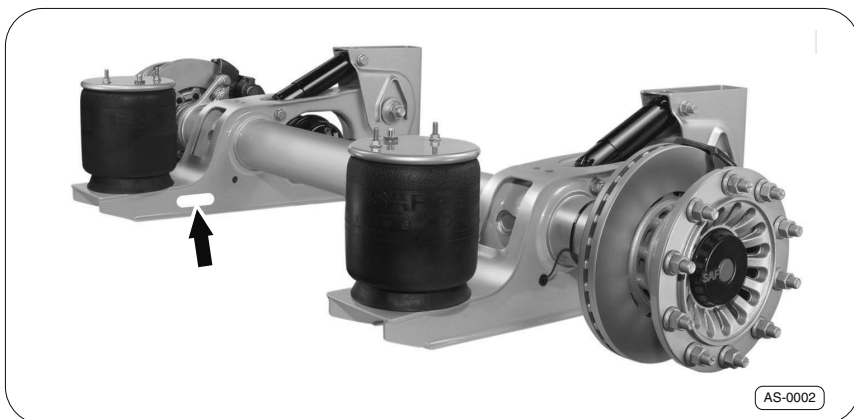


Fig. 2 · Position of the type plate, air suspension system type INTRA

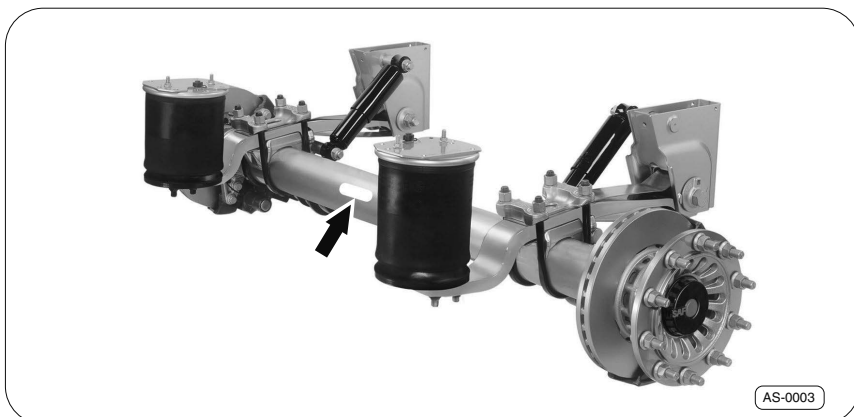


Fig. 3 · Position of the type plate, air suspension system type MODUL and pendal axles

1.3 Identification in case of missing type plate

The axle's serial No. is embossed on the axle journal, on the right-hand side, viewed in the direction of travel (fig. 4, item 1).

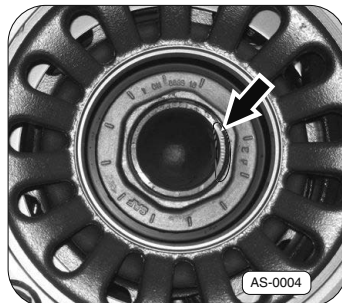


Fig. 4 · Right-hand axle stub end:
Serial No.

The data for ordering spare parts from SAF-HOLLAND can be entered in the following field.

	Ident No.	Serial No.
1. axle		
2. axle		
3. axle		
4. axle		
5. axle		

2 Ordering spare parts

When ordering original spare parts from SAF-HOLLAND, make sure that you pay attention to the assembly groups of the respective product.

Reproduction parts have a negative effect on the function of the product, have a shorter lifetime and cause risks and hazards, which SAF-HOLLAND cannot evaluate. They also increase the maintenance requirement.

For technical information on SAF-HOLLAND products and the purchase of parts, a comprehensive service network of SAF-HOLLAND partner companies are on hand to help you (see the back page or visit us online at www.safholland.com).

For further instructions on identifying spare parts refer to our homepage www.safholland.com in the "After-market" section.

Updates are published on the internet at www.safholland.com as necessary.

3 General information

3.1 Liability

SAF-HOLLAND's "General Terms and Conditions" apply ..

SAF-HOLLAND does not recognise any liability claims for personal injury or material damage which are caused by one or more of the following causes:

- Improper use of the product ⇒Page 7.
- Failure to adhere to the operating manual and the safety instructions contained in it.
- Arbitrary constructional changes to the product.
- Insufficient maintenance of parts which are subject to wear ⇒Page 9,
- Improper maintenance work and maintenance work that is not performed in good time ⇒Page 9.
- The use of any spare parts other than original SAF-HOLLAND parts ⇒Page 5,
- the use of damaged parts,
- disasters due to external influences or acts of God.

3.2 Warranty and general terms and conditions of business

For information on our current warranties and general terms and conditions, refer to the "Sales" section of our homepage at www.safholland.com .

3.3 Environmental protection

All components and consumables used for maintenance and care must be disposed of in an environmentally friendly manner.

Recyclable components must be cleaned of oil and lubricants and recycled. When doing so, you must adhere to the disposal instructions for the respective consumables and the valid national and regional regulations.

4 Safety

4.1 Target group

The operating manual for the product is restricted exclusively to use of the product by the user and personnel authorised and instructed by the user.

The user must ensure that the personnel authorised by him receive regular instruction on the content of the operating manual and in particular the safety instructions it contains.

4.2 Proper use

The product has been constructed using state-of-the-art technology and in accordance with the recognised rules of technical safety. However, its use may result in hazards for the operator or third parts or damage to the device or other objects of material value. The product must only be used as a steering axle or fixed axle.

Proper use also includes:

- Adherence to the operating manual and implementation of the working steps stipulated in the operating manual.
- Adherence to the performance limits of the product. ⇒Fig. 1.1,
- Adherence to all maintenance and care instructions and additional inspections.
- The use of the listed consumables ⇒Page 9 and their disposal in an environmentally friendly manner ⇒Page 6.

Operationally safe function can only be guaranteed if all the instructions, adjustments and performance limits for the product are adhered to.

4.3 Safety instructions and symbols used in the operating manual

The following symbols are used to denote particularly important information and sections of the text. Make sure that they are always read and adhered to before working with the product.



Danger!

This safety instruction with the signal word warns of a possible safety risk or serious and fatal injuries.

**Careful!**

This safety instruction with the signal word warns of a possible damage to the product.

**Note:**

Marking for special user tips and other particularly useful and important information for efficient work and economical use.

4.4 Marking used for sections of text

- Marking for instructions for actions and information in safety instructions
- 1., 2., 3., ... Marking used for working steps

4.5 General safety instructions

It is imperative to adhere to the following safety instructions for your SAF-HOLLAND axles and suspensions in order to comply with operational safety and traffic safety:

Danger!

Risk of serious traffic accidents which may lead to serious or fatal injuries.

Operation

- You must make sure that the brakes do not overheat, e.g. due to continuous use. Overheating on drum brakes can lead to a dangerous reduction of the braking power. On disc brakes overheating can cause damage to the surrounding components - in particular the wheel bearing. This can be seriously detrimental to safety, e.g. can cause the wheel bearings to fail.
- In case of overheating the parking brake must not be applied until the brake has cooled down. The brake discs and brake drums may otherwise become damaged as a result of different levels of tension arising during the cooling process.



Danger!

- When loading and unloading the provided support devices must be used in order to prevent damage to the axle.
- Adhere to the trailer manufacturer's recommendations for OFF ROAD use of the installed axles and suspensions. The SAF-HOLLAND definition OFF ROAD refers to driving on nontarmacked/concreted stretches, e.g. gravel roads, countryside and forest roads, on construction sites and in gravel pits.

The operation of SAF-HOLLAND axles and suspensions in OFF ROAD use which are not conceived for this purpose can cause damage and thus compromise traffic safety.

Care

- The wheel contact surfaces between the wheel disc and wheel hub and the wheel nut contact surface at the wheel disc must not be additionally painted. The contact surfaces must be clean, smooth and free from grease. Failure to observe this may result in the wheel coming loose. Any additional instructions of the wheel manufacturer must also be observed.

Further safety instructions

- You must only use the wheel rims and tyre sizes specified by the trailer manufacturer. The tyres must always have the stipulated air pressure.

5 Maintenance Procedures

5.1 General maintenance instructions

Danger!

Risk of serious traffic accidents which may lead to serious or fatal injuries.

- Maintenance tasks must only be carried out by authorised specialist workshops and by staff with the appropriate training.

**Danger!**

- The wheel nuts have to be re-tightened with the stipulated tightening torque values, initially after 50 km and then after 150 km.
- At the latest 5,000 km after commissioning the semi-trailer/trailer, the brake systems on the tractor and the semi-trailer/trailer must be adjusted to each other by way of a tractor/trailer brake synchronisation in order to ensure that the brakes perform evenly and the brake pads wear evenly. Tractor/trailer brake synchronisations should be performed by specialist brake workshops. On vehicles with EBS a balancing inspection has to be carried out.
- All components which are not in a serviceable condition must be replaced.
- The general safety inspection must be performed as per legal regulations.
- Daily inspection of the vehicle for traffic safety before starting the journey is part of the duty of the driver.

In order to maintain operational and traffic safety SAF-HOLLAND axles and suspensions require continuous care, inspections and maintenance so that natural wear and faults can be detected in good time.

SAF-HOLLAND recommends that you carry out the inspections and maintenance tasks described in the chapter "Maintenance". In case of repairs you must always follow the SAF-HOLLAND repair instructions and directions.

5.2 Before each journey**Danger!****Risk of serious traffic accidents which may lead to serious or fatal injuries.**

- The maximum permitted axle load must not be exceeded and the loaded goods must be positioned with an even distribution.





Danger!

- For vehicles with an air suspension system, you must ensure that the airbags are fully inflated with air. An incomplete supply of air can cause damage to the axles, chassis, frame and attachment and compromise traffic safety.
1. Carry out general visual inspections on the tyres and all parts of the chassis to make sure they are firmly fastened and check for wear, leaks, corrosion and damage.
 2. Carry out general visual checks on the brakes to make sure they are firmly fastened and to check for wear, leaks, corrosion and damage.
 3. Remove any abrasive dirt before starting the journey in order to prevent damage to the traffic behind.

5.3 Service schedule

Danger!

Risk of serious traffic accidents which may lead to serious or fatal injuries.

- Maintenance tasks must only be carried out by authorised specialist workshops and by staff with the appropriate training.
- In the case of vehicles with extreme operating conditions, e.g. OFF ROAD or multiple-shift operation, the maintenance intervals have to be shortened from 12 months/150,000 km to 6 months/75,000 km.

Maintenance work on the axle

	Initially after 1 month or 5,000 km	According to the vehicle manufacturer's information	Every 3 months or 30,000 km	Every 6 months or 75,000 km	Every 12 months or 150,000 km
Check the wheel bearing unit for leaking grease					X
Check and, if necessary, adjust ⇒Page 21.		X			
On aluminium and stainless steel hanger brackets check the screw connections, pivot bolts and shock absorbers with the stipulated inspection torque ⇒Page 18. Initially after 500 km.				X	
On MODUL suspensions the U-bolts must be tested with the respective test torque values ⇒Page 18.					X
Test the screw connection for the airbags with the stipulated inspection torque ⇒Page 18.					X
For steering axles lubricate the bearing points of the king pin bolts ⇒Page 21.	X			X	
Check the condition of the outer bellows on the brake calliper for cracks and damage. Check that the adjuster cover cap is firmly in place.					X
Check the wear limits on the brake pad ⇒Page 13 and brake disc ⇒Page 17.			X		
Check the brake calliper guide system to make sure it is free to move/float.					X
Check the brake disc for cracking ⇒Page 17.				X	
Check the brake disc for corrosion, initially after 3 years then every 12 months.					
General safety inspection as per legal regulations.					

5.4 Identification of the brake type

The brake is identified by referring to ⇒Fig. 1 field "Version" on the axle's type plate. The combination of numbers and letters after the hyphen indicate the type of brake:

- xxx-22S = SAF brake disc type SBS 2220 ⇒Page 13
- xxx-22K01 = KNORR disc brake type SK7 ⇒Page 14
- xxx-19K = KNORR disc brake type SK6 ⇒Page 15
- xxx-19W = WABCO brake disc type PAN 19-1 plus ⇒Page 16
- xxx-22W = WABCO brake disc type PAN 22-1 ⇒Page 16

5.5 Inspecting pad wear

SAF brake disc type SBS 2220

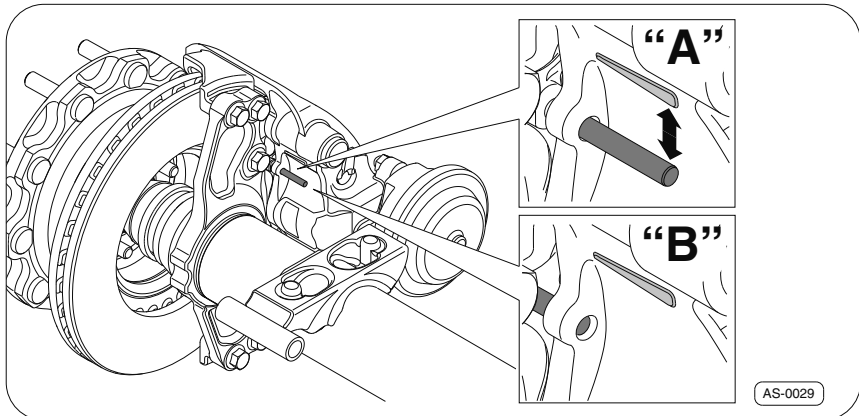


Fig. 5 · SAF brake disc type SBS 2220

With the Visual Wear Indicator (VWI) in position, the total wear to the brake disc and both brake pads can be checked with wheels attached.

Condition "A" shows the position of the VWI for **average** brake pad thickness.



Danger!

Risk of serious traffic accidents!

Once the wear limits have been reached the brake pads and brake discs must be replaced immediately by an authorised specialist workshop and by staff with the appropriate training.

If condition "B" is reached, the brake pad thickness and the brake disc thickness will need to be checked with the wheels removed.

KNORR disc brake type SK7

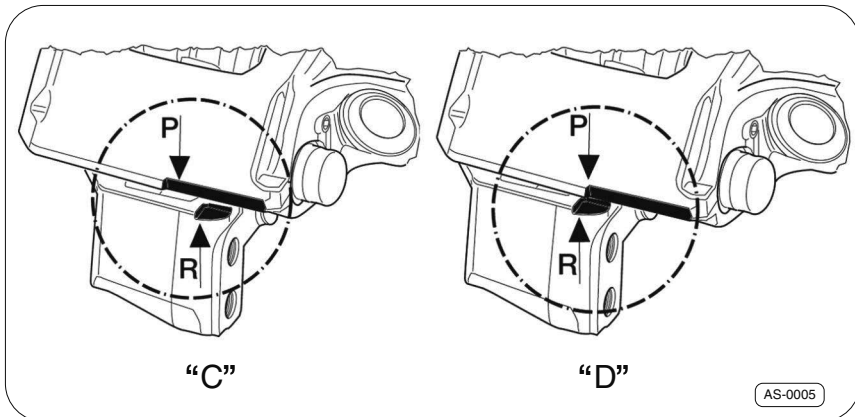


Fig. 6 · KNORR disc brake type SK7

The brake pad thickness can be determined with wheels attached by checking the position of the brake calliper marking –P– against the fixed brake spider marking –R– .

The condition "C" shows the **average** brake pad thickness.



Danger!

Risk of serious traffic accidents!

Once the wear limits have been reached the brake pads and brake discs must be replaced immediately by an authorised specialist workshop and by staff with the appropriate training.

If condition "D" is reached, the brake pad thickness and the brake disc thickness will need to be checked with the wheels removed.

KNORR disc brake type SK6

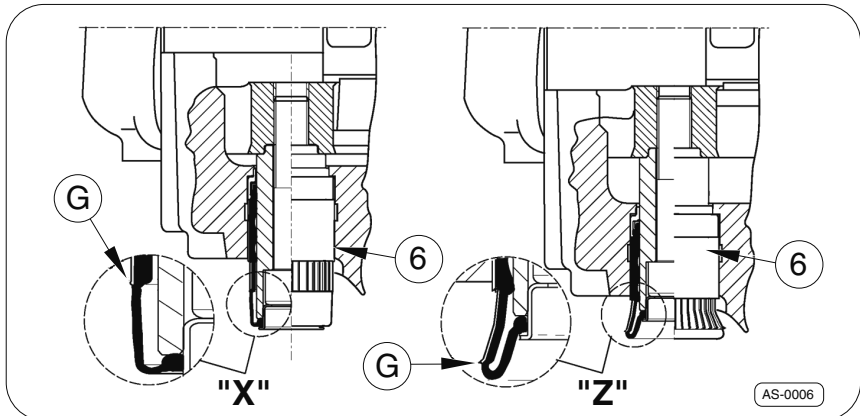


Fig. 7 · KNORR disc brake type SK6

The total wear to the brake disc and both brake pads can be determined with wheels attached by checking the position of wear marking –G– (transition from the grooved area to the smooth area).

The condition "X" shows the new condition of the wear marking –G– on the guide sleeve –6–.

**Danger!****Risk of serious traffic accidents!**

Once the wear limits have been reached the brake pads and brake discs must be replaced immediately by an authorised specialist workshop and by staff with the appropriate training.

If condition "Z" is reached, the brake pad thickness and the brake disc thickness will need to be checked with the wheels removed.

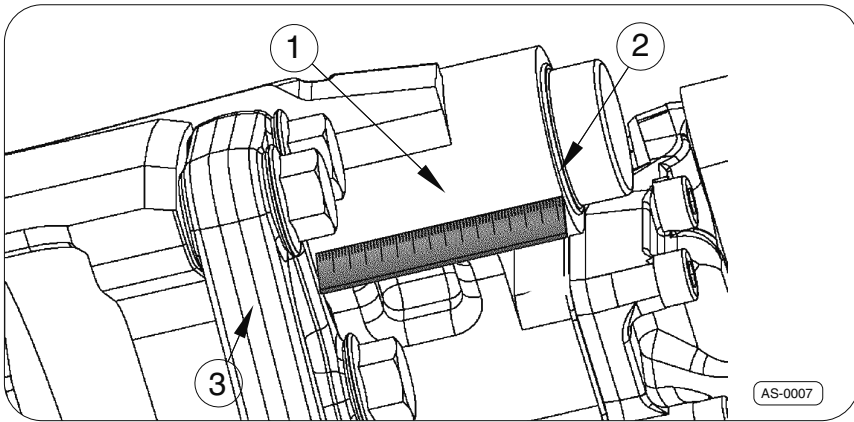
WABCO disc brake type PAN 19-1 plus and 22-1


Fig. 8 · WABCO disc brake type PAN 19-1 plus and 22-1

The total wear of the brake disc and both brake pads can be checked with wheels attached at the guide pins –1–.

To do so, the gap between the brake spider –3– and the edge of the brake calliper –2– is measured.

Danger!**Risk of serious traffic accidents!**

When the dimensions are **larger** than those given in the table, the brake pads and brake disc must be replaced immediately by an authorised specialist workshop and by staff with the appropriate training.

Wear check	PAN 19-1 plus	PAN 22-1
on the long guide pin	> 94 mm	> 88 mm
on the short guide pin	> 67 mm	> 63 mm

5.6 Checking the wear on the brake disc



Danger!

Risk of serious traffic accidents!

Once the wear limits have been reached the brake pads and brake discs must be replaced immediately by an authorised specialist workshop and by staff with the appropriate training.

Wear limits on the brake disc

brake disc		
Ø (mm)	"A" new (mm)	"B" Wear limit reached (mm)
430	45	37
377	45	37

Wear limits on the brake pad

brake pad	
"C" new (mm)	"D" Wear limit reached (mm)
WABCO/ KNORR	WABCO/KNORR
32/30	11/11/9 ¹⁾
32/30	11/11

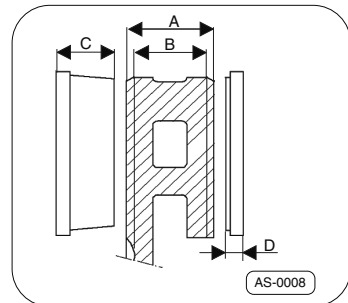


Fig. 9 · Wear limits

5.7 Cracking on the brake disc

- Carefully check the brake surface of the brake disc for cracking.

¹⁾ Knorr SK7 only



Danger!

Risk of serious traffic accidents!

In case of full-length cracking/cracking all the way through – D1– , skimming is not permitted.

In case of cracking on the brake disc the disc can be skimmed by a workshop as necessary.

For reasons of safety the minimum dimension for overturning the brake discs is set at 39 - 40 mm.

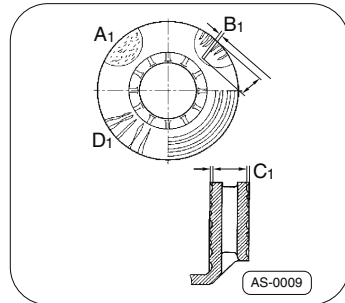


Fig. 10 · Cracking on the brake disc

item	Type of cracking	permitted	not permitted
–A1–	Network-type cracking	X	
–B1–	Cracks of up to max. 1.5 mm (width and depth) which run to the centre of the hub	X	
–C1–	Unevenness of the disc surface	X	
–D1–	Full-length cracking/cracking all the way through		X

5.8 Inspection torque

Danger!

Risk of accidents due to loose screw connections.

- Threads must not be oiled or greased.
- Do not loosen screws.
- Check the inspection torque with a pre-set torque wrench. If the stipulated inspection torque is not achieved, an authorised specialist workshop with appropriately qualified staff must be visited.

SAF INTRA

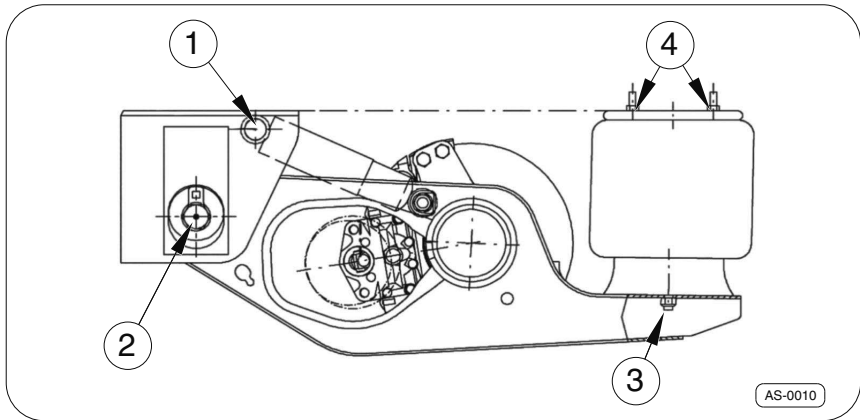


Fig. 11 · SAF INTRA inspection torque

Item	Screw connection	Inspection torque (Nm)	Width across flats (WAF)
-1-	M20x1.5	600	30
-2-	M30	1200	46
-3-	M16	80	24
-4-	M12	40	19

SAF MODUL

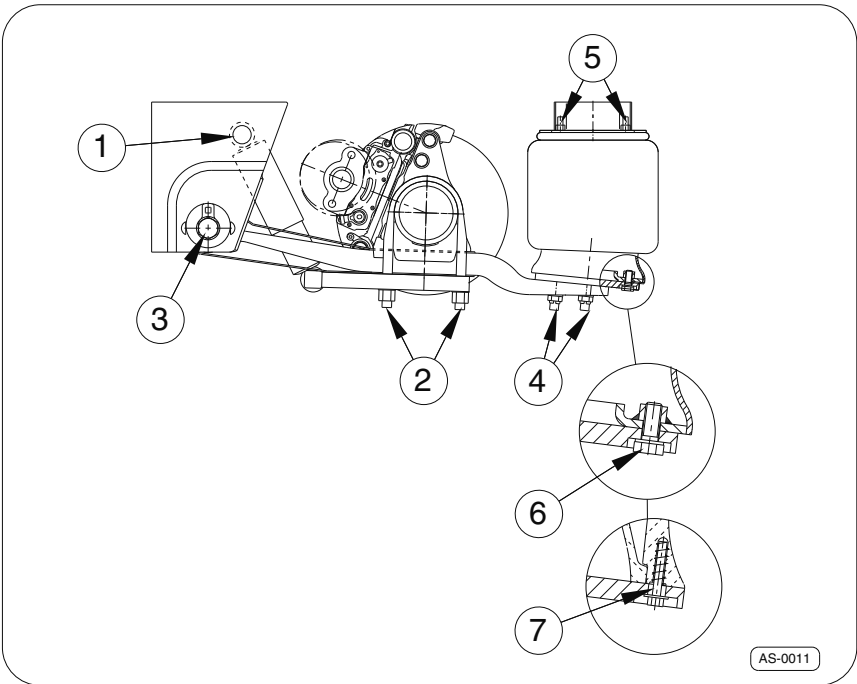


Fig. 12 · SAF MODUL inspection torque values

Item	Screw connection	Inspection torque (Nm)	Width across flats (WAF)
-1-	M24x2	400	36
-2-	M22x1.5	580	32
-3-	M30	1200	46
-4-	M20	180	30
-5-	M12	40	19
-6- ²⁾	M12	80	19
-7- ³⁾	K100x40	20	10

²⁾ For steel airbag pistons

³⁾ For plastic airbag pistons

5.9 Lubricating the king pin bolt on steering axles



Careful!

Risk of damage to the king pin bolt!

- Only use the stipulated lubricant.
- Lubricate the axle only when not loaded.
- Only lubricate the stipulated lubricating points.

To lubricate the king pin bolt, use special lithium complex soap lubricating grease (SAF-HOLLAND part number 5 387 0011 04).

- Lubricate the king pin bolt thoroughly on the lubricating nipple –1–.

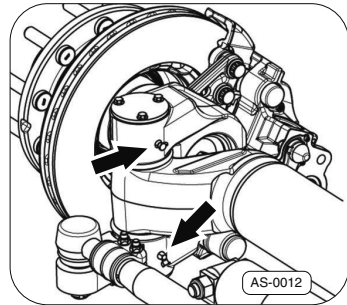


Fig. 13 · Lubrication points on the king pin bolt

6 Jacking point

Raise the vehicle with the jack ⇒Fig. 14 as shown.

Careful!

Risk of damage to the axle!

The jack must only be positioned as shown in ⇒Fig. 14 .

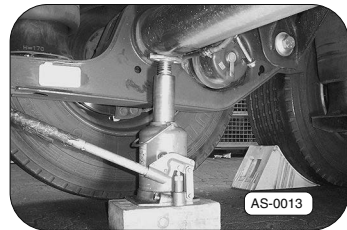


Fig. 14 · Jacking point

7 Inclination of the semi-trailer

On **single axles** a minimum suspension travel of 60 mm must be observed.

On **multiple axle trailers** a minimum suspension travel of 70 mm must be observed.

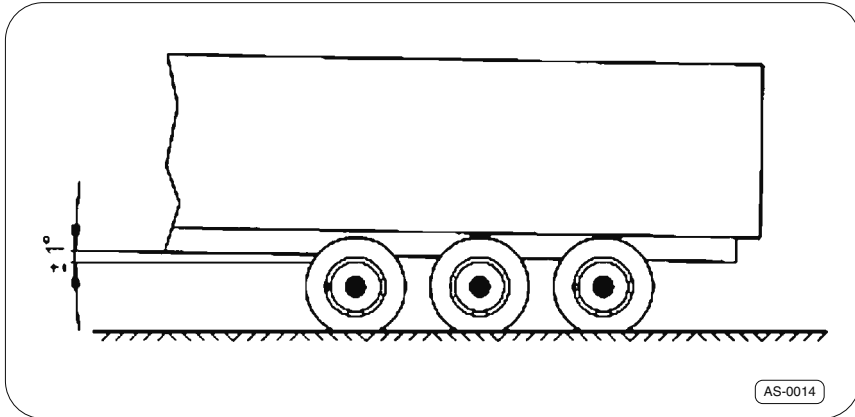


Fig. 15 · Inclination of the semi-trailer



Careful!

Risk of damage to the vehicle!

The maximum inclination of the semi-trailer must not exceed 1 degree or 20 mm per metre.



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