

WHEELBRAKE SERVICE GUIDE

Version 1.0 | 2019 ©



Foreword

Dear partners, dealers and colleagues,

The AL-KO wheel brake has been a proven and reliable technology for many decades now, which has been continually improved in the course of various product further developments.

One could think it is a simple product at first glance - hardly anyone notices the technical details involved in such safety-relevant components.

This guide forms the perfect supplement to our service manuals, instructions and training and also accompanies you on the customer level. It provides a bit of background on the product and puts lots of legends and opinions to bed.

Indeed, this guide is exactly what defines our technical world: a continually growing instrument, which should primarily benefit from the input and experiences of its readers.

Use our work as reading matter or a dictionary, as a spearhead of our new, fresh training concept, it is an open book - which is continually updated and ready to download on our service portal.

I hope all the readers enjoy gaining plenty of information,

on behalf of

Maximilian Lukas, Head of Customer Service

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1.0 ABOUT THIS BRAKE GUIDE

1.1 Structure and handling of this document

Target group

This guide is aimed at workshops, dealers and partners who deal with our AL-KO brake systems in commercial trailers and the leisure sector. It is the standard work for all service work, customer service and support on all aspects of our wheel brakes. It is a reference work for all service employees, who are familiar with the maintenance and repair work of our AL-KO products.

Symbols and instructions



ATTENTION! DANGER!

This infobox indicates a danger to people and the product. Follow these instructions to avoid life-threatening injuries to humans and severe damage to products.



ATTENTION!

This infobox indicates a danger to people and the product. Follow these instructions to avoid life-threatening injuries to persons and severe damage to products.



NOTE!

Follow these instructions to work in a safer and more effective manner. They explain the background and special technical features of our products.



TIP

This infobox shows you swift and effective tricks for handling our products. They have generally been gained from practical experience and considerably simplify a number of work steps.

Structural design

The manual includes general through to specialised knowledge and theoretical information through to practical everyday advice. Attached you will find checklists which are predominantly helpful in the case of making dialog and the annual customer service.

The higher-level chapters are listed in whole numbers with a zero. The subchapters, so-called columns are continued with 1.1, 1.2 etc.. The column title is active and can be found at any time in the header as quick access.

Handling instructions

Handling instructions for activities are sequentially numbered. Perform the working steps in this order.

1. Working step 1
2. Working step 2

TEXT DESCRIBING IMAGES

Text, which relates to an image or drawing, is represented with a letter in square brackets. **[A]**

Text, which describes components in illustrations and drawings, is described with a number in round brackets. **(4)**

ILLUSTRATIONS AND DRAWINGS

All drawings and figures are used for illustrative purposes and are examples only. They can therefore deviate slightly from the original.

Let's get started!

The following chapters provide information about the installation, maintenance, repair and function of all essential AL-KO wheel brake components, thus enabling fast and efficient service from maintenance personnel.

We reserve the right to make changes and additions to this manual for the purpose of technical progression and technical innovation.



Please read this document before installation. This is a prerequisite for safe work and problem-free handling.

Observe all the safety instructions and ensure that you carefully read through the "For your safety" chapter.

1.2 Contacts and contact partners

Please contact our Customer Service Centres if you have technical questions:

Customer Centre South	Customer Centre North	Customer Centre West
ALOIS KOBER GMBH Bahnhofstraße 40 89359 Kötzing, Germany	ALOIS KOBER GMBH Niederlassung SAWIKO Ringstraße 3 49434 Neuenkirchen-Vörden, Germany	ALOIS KOBER GMBH Niederlassung E&P Daimlerstraße 8 50189 Elsdorf, Germany
Phone: +49 8221 97 0	Phone: +49 5493 99 22 0	Phone: +49 2274 700 397
E-mail: info@alko-tech.com	E-mail: info@sawiko.com	E-mail: info@ep-hydraulics.de

2.0 IMPORTANT INITIAL MATTERS

2.1 For your safety

Because of the various installation situations and the potential hazards of incorrect installation, this service guide is only appropriate for technical personnel who have been specially trained by AL-KO Academy.



TRAINING

For further information on training, please refer to the “AL-KO Academy” chapter.



ATTENTION! DANGER OF FATAL INJURY DUE TO FAULTY WORK!

- All of the work described in this guide may only be carried out by properly trained technical personnel!
- For work on the brakes on public roads, a certain degree of training and care is required.



ATTENTION! RISK OF ACCIDENTS!

Mistakes when working on the wheel brake can lead to life-threatening situations.

- All work on the wheel brake may only be carried out by specially trained personnel.
- Use only original AL-KO spare parts.



ATTENTION! DANGER OF FATAL INJURY DUE TO FAULTY SECURING!

- Before commencing all installation and service work, the vehicle must be properly jacked up.
- In doing so, the permitted load capacity of the hydraulic ramp must be sufficient!



ATTENTION!

- During all work, observe the installation instructions of the base vehicle manufacturer and our service instructions (refer to the “Required AL-KO literature” chapter).
- The bolt dimensions, bolt qualities and tightening torques prescribed by AL-KO must be complied with.



ATTENTION!

- Always replace self-locking nuts after they have been unscrewed
- Always exchange damaged bolts

2.2 Spare parts

Spare parts are safety parts!

- For unique spare part identification, our service stations will need the spare part identification number (ETI).
- For the installation of spare parts into our products, we recommend the use of original AL-KO parts, or parts that we have expressly approved for installation.



Why use AL-KO original parts?

The reliability, safety and suitability of these spare parts specifically for our products have been established in a special test process. Despite ongoing market monitoring, we cannot make a judgement regarding other products nor can we recommend their use.

2.3 Legal notices

As a supplier, Alois Kober GmbH shall be liable only in terms of the scope of its own construction and production services.

Alois Kober GmbH accepts no liability for accidents or injuries arising from modifications or failure to observe the specifications contained in this documentation or if the installation of bodies and conversions has been carried out improperly.

2.4 Required AL-KO literature

In order to execute many of the described processes, such as the dismantling of a wheel brake or the installation of the overrun device, required supplementary literature is provided by AL-KO.

We recommend the following documents to accompany this guide:

695099_wheel brake service manual

695102_service manual AAA

695100_Bowden cables

695101_brake adjustment

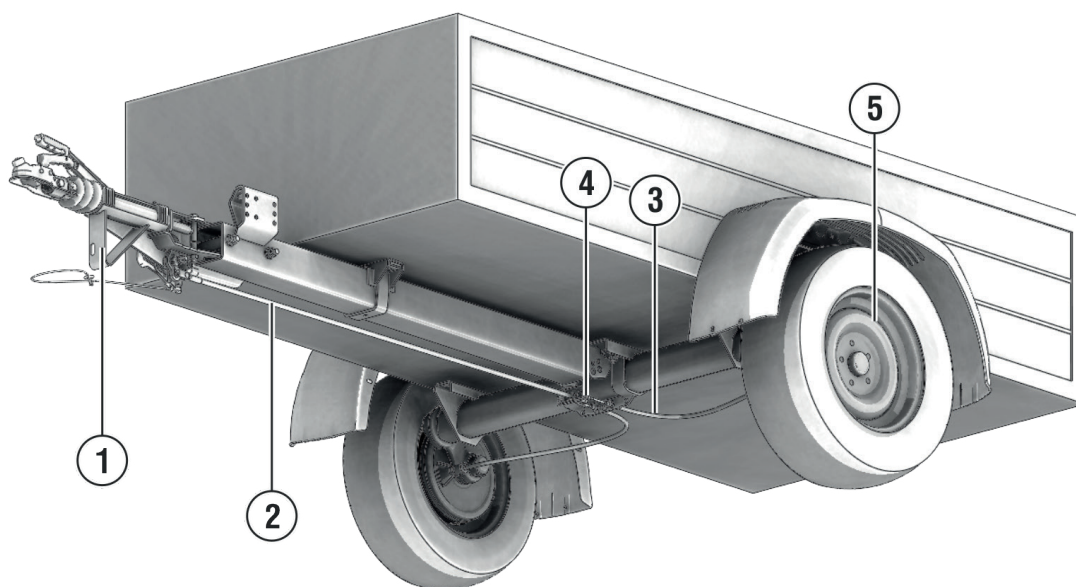
1361869_ATC operating manual

This guide makes reference to these documents several times. All of these documents can be downloaded at our service portal:

www.alko-tech.com/de/serviceportal User name: **service** Password: **Login.AL-KO**

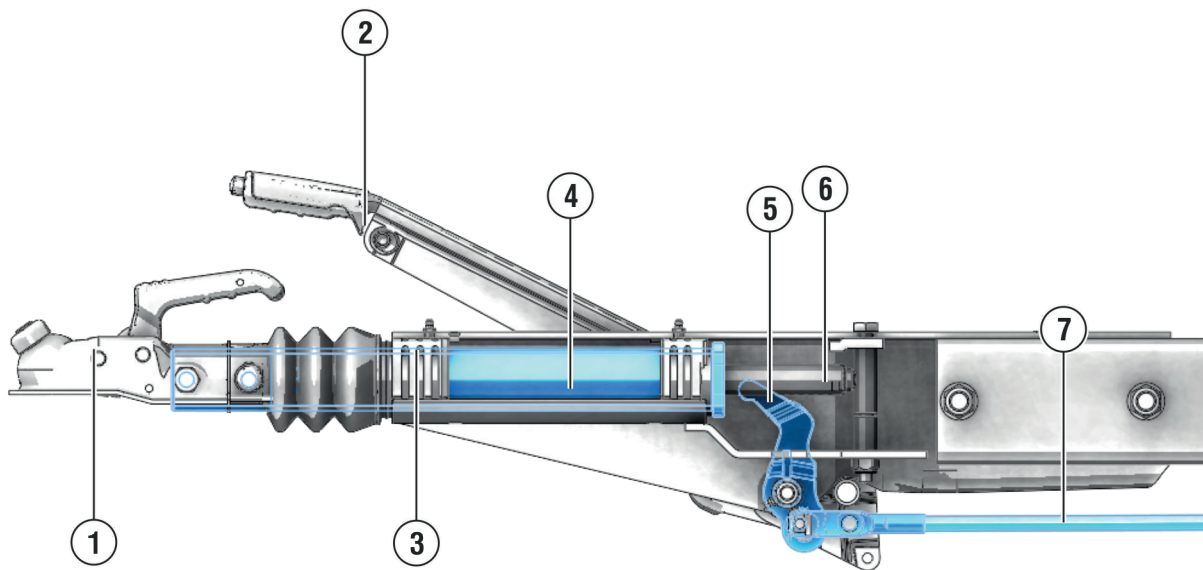
3.0 THE AL-KO BRAKE SYSTEM

3.1 Structure and components of an overrun brake



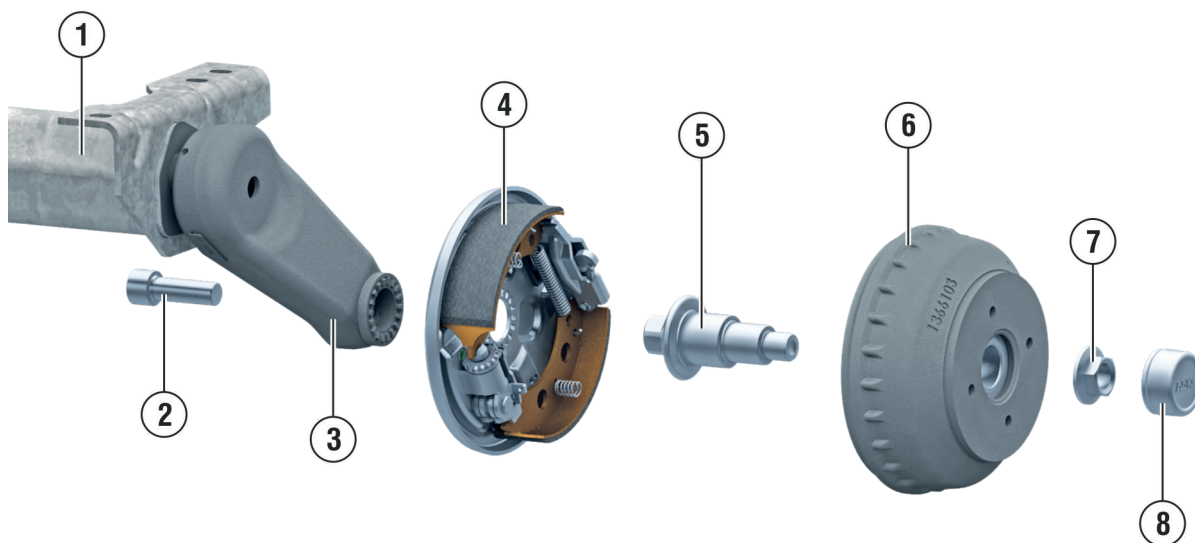
POS	Designation	Description
1	Overrun device	Absorbs the overrun forces and diverts this pressure force to tensile force via the relay lever
2	Brake rod	Transfers the tensile force to the compensation profile. The brake rod can also be adjusted.
3	Bowden cables	One Bowden cable per brake drum, which activates the brake via the expanding joint lock.
4	Brake compensation	Ensures that both Bowden cables are equally applied in the case of uneven braking.
5	Wheel brake	Drum brake system, mounted in a floating manner, converts the overrun energy occurring at the overrun device to brake force.

3.2 Components of an overrun device



POS	Designation	Description
1	Towing device	Connection to the towing vehicle. May be coupling head, anti-sway protective coupling, or in the commercial field even drawbar eyes.
2	Handbrake lever	The handbrake or the parking brake blocks the drum brake and prevents the trailer from rolling away.
3	Bearing cartridge	Can be made of one cast part or two bearing parts and leads to the drawbar tube being as frictionless as possible.
4	Drawbar tube	The drawbar tube is actually a pressure pipe, which is decelerated by the overrun damper and transfers the overrun pressure to the relay lever. The straight and low friction guiding is particularly important, as the braking energy is not lost during the overrun procedure.
5	Relay lever	It converts compression force to tension force. Depending on the brake size, the lever is longer or shorter and can be adjusted by a universal lever.
6	Gas springs / overrun dampers	The gas springs decelerate the overrun movement to initiate braking in a more comfortable and controlled manner. If this is defective, the drawbar tube can overrun instantaneously. The driver will feel a hard impact on the towbar connection. Braking does then not take place evenly but in an abrupt and too heavy manner.
7	Brake rod	Transfers the tensile force to the compensation profile. The brake rod can also be adjusted.

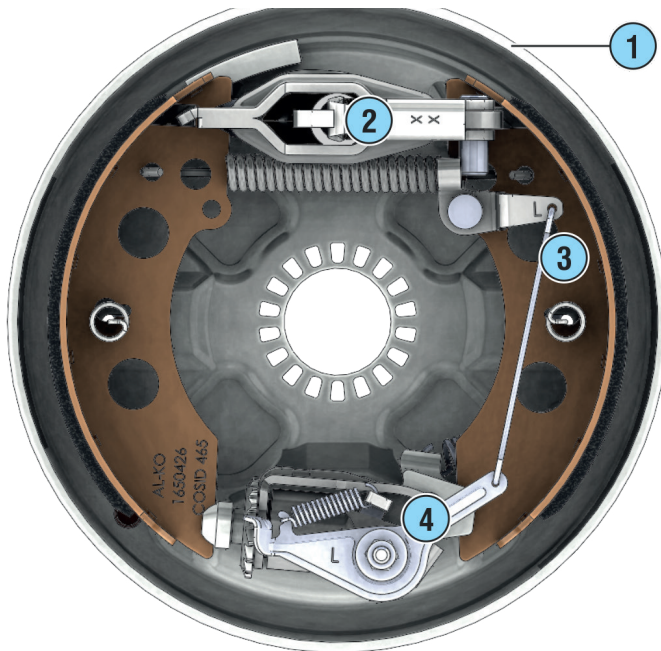
3.3 Components of the drum brake



POS	Designation	Description
1	Axle with axle bracket	(Here shown as a design with hexagonal rubber suspension axle and welded swing arm)
2	Axle stub bolt	The axle stub bolt holds the entire brake unit together. It is bolted by the swing arm in the axle stub with high torques. In principle, the entire wheel incl. brake drum, rim and tyres are loaded on it.
3	Swing arm	Due to the decentral wheel suspension, suspension travel is enabled at the otherwise right inflexible axle. The vertical effective force of the spring movement on the wheel is converted in the axle to a rotational movement. Furthermore, the chamfering on the contact surface defines the track and camber.
4	Brake back plate / wheel brake	The component also called the brake anchor plate is the fastening point for all movable mounted brake components and functions of the AL-KO wheel brake. For further detailed information on all components, see the next section.
5	Axle stub	This is the central "nut" on which all components are mounted.
6	Brake drum	The brake drum is used as a counterpart to the brake shoes, the brake shoe is abraded here. What's more, the rim is also fastened to the brake drum.
7	Flange nut	The flange nut seals the system and it is tightened with securing bolts
8	Dust cap	Protects against dirt in the bearing seat and also protects the flange nut against unauthorised opening. Can be removed with a special tool. Part number: 603751

3.4 Structure of a wheel brake

Basic components



The basic components of a wheel brake are the same for all wheel brake types.

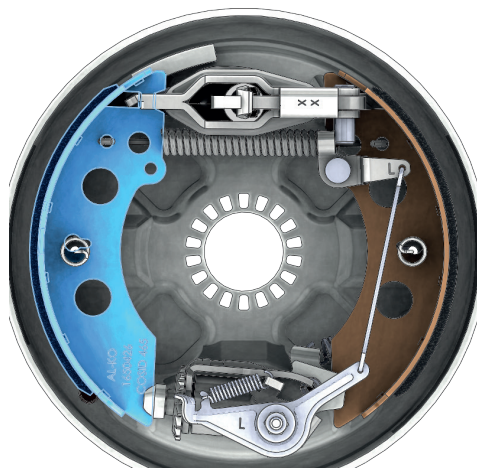
The brake back plate also referred to as the anchor plate **(1)** holds these components.

The expanding joint lock **(2)** opens when the Bowden cable is pulled on and therefore pushes the brake shoes apart.

The brake shoes **(3)** themselves abrade the brake drum and thus generate the braking.

The adjuster unit **(4)** ensures either automatically or manually that the distance from the brake shoes to the drum is not too low, so that the braking can always take place with the same degree of quality.

All components in detail



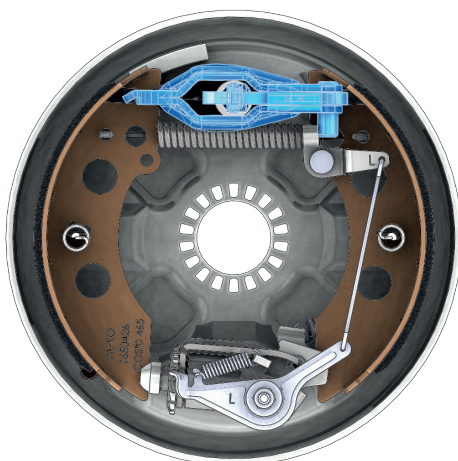
THE PRIMARY BRAKE SHOE

As the primary brake shoe, during the braking process in the forwards direction the brake shoe is loaded more heavily.

It absorbs the forces which occur through the direction of rotation of the brake drum and tilts in the driving direction.

The primary brake shoe indicates a higher level of wear due to the physical conditions.

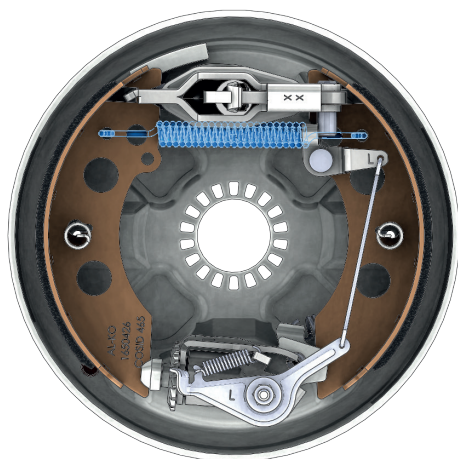
The spyhole for the wear indicator is therefore also attached to the underside of these brake shoes.



THE EXPANDING JOINT LOCK

In the expanding joint lock, the Bowden cable is suspended on the hock-in eye.

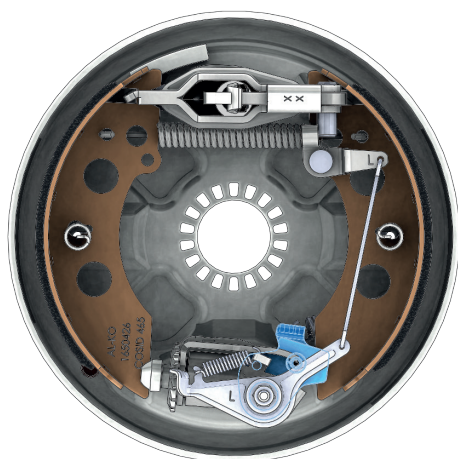
If the handbrake or the overrun brake is actuated, the Bowden cable pulls on the hock-in eye and therefore pushes the lock apart. The brake shoes are pushed apart, the braking process is initiated.



THE RETURN SPRINGS

If the brake is actuated by the Bowden cable, the expanding joint lock expands and the brake shoes press against the inner wall of the brake drum.

Following the braking process, the return springs return the two brake shoes to their starting position.

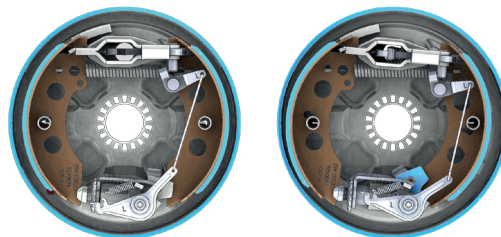


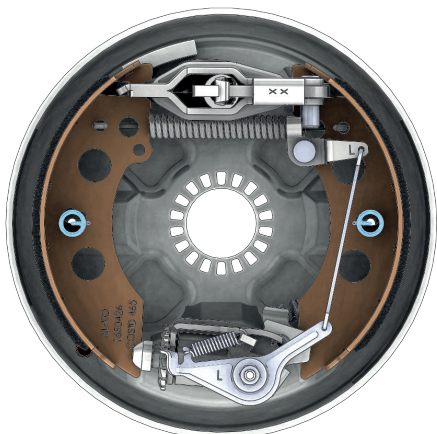
THE AUTOMATIC REVERSE LEVER

The only difference between overrun braking and braking during reversing is the direction of rotation of the wheel.

To ensure that the brake is not blocked during reversing, the automatic reverse lever can be released, i.e. folded away for brake shoes when braking is initiated during reversing.

The residual braking force is then still around 8%. The trailer can be driven in reverse in a virtually unhindered manner.

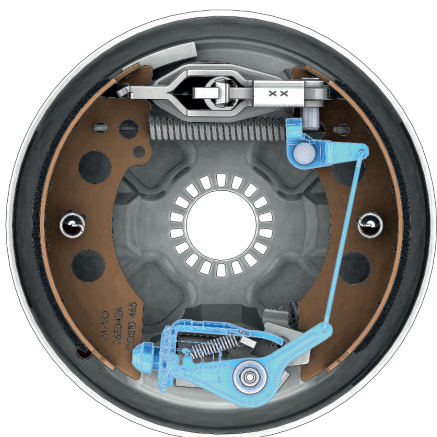




THE HOLD-DOWN SPRINGS

The hold-down springs connect the brake shoes and all associated movable parts with the brake back plate (anchor plate).

They are an essential element which enables the wheel brake to be mounted "in a floating manner".



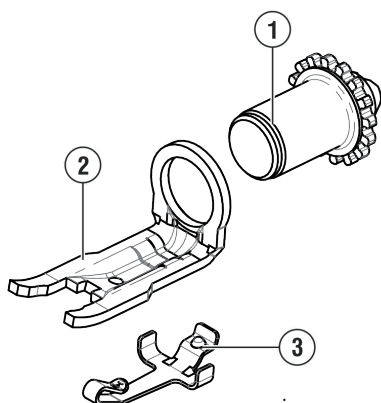
THE ADJUSTER UNIT (STANDARD)

A type of expanding joint lock provided with only one adjusting nut to permanently change the shoe position.

It is also very important for the basic setting of the brake. As such, the clearance which specifies the distance between the shoes and the drum in a un-actuated state, can be increased and decreased at the adjuster unit.

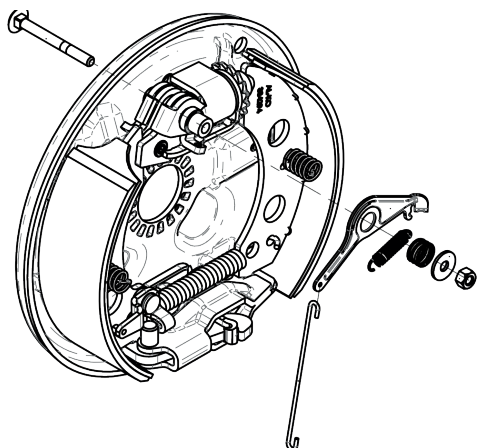
Thanks to this unit, the brake wear is compensated. It comprises the following components:

- (1) Adjusting nut
- (2) Tension clip
- (3) Rotation lock



The tension clip is pushed out by the automatic reverse lever and pushes the adjusting nuts against the brake shoe. In doing so, the entire system is moved so that the brake is released again.

The rotation lock prevents the adjusting nuts from opening during transport or vibrations. It is also used as a kind of grid to make the manual adjustment more precise.



THE SELF-ADJUSTING ADJUSTER UNIT (ONLY FOR AAA)

AAA - AL-KO Automatic Adjustment Brake

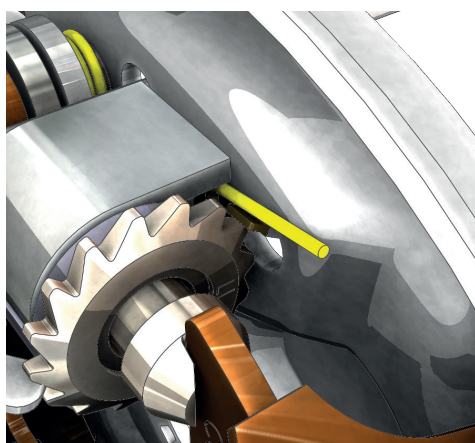
The automatic adjustment means the manual adjustment is no longer needed.

Via the lever system, the adjusting nut is rotated by a further tooth in the case of too large a clearance.



Self-adjusting = no maintenance?

the system automatically adjusts the optimum clearance. However proper maintenance **cannot** be omitted. The maintenance interval also remains the same. Further details can be found in the "Maintenance" chapter

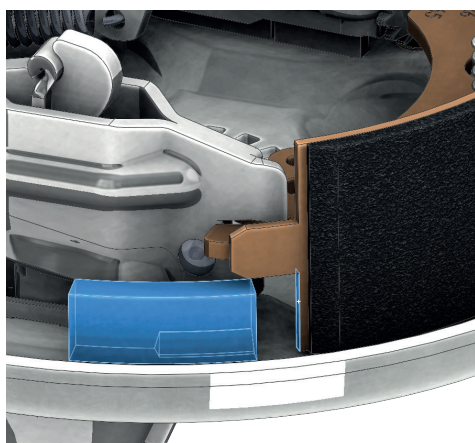


THE CENTRING BRACKET (ONLY FOR AAA)

In order to improve the brake adjustment, a centring bracket has been fitted in our wheel brakes since 2019.

It holds the movable mounted adjuster unit in position so that the adjusting bracket can take immediate action if an adjustment is required.

Furthermore, the centring bracket prevents one of the most frequent errors: The brake cannot be manually adjusted in the wrong direction.



THE SERVO STOP

The servo stop forms an end stop for rotating the brake shoes.

During normal braking, there is large spacing between the servo stop and brake shoe.

During reversing, the automatic reverse lever is engaged and lowered. The brake shoe is pushed further towards the stop in order to open the brake again.

If the handbrake is however applied and the vehicle rolls backwards, the servo stop prevents the automatic reverse lever from being leveraged too far and the handbrake therefore does not take effect.

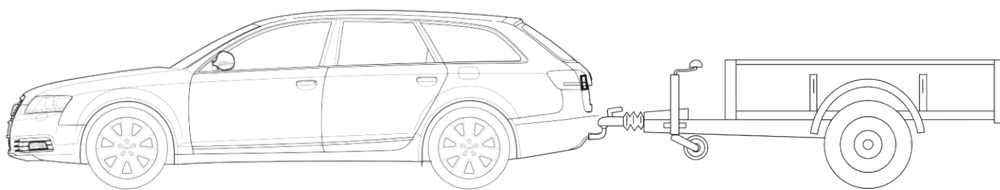
3.5 Functional principle of the overrun brake



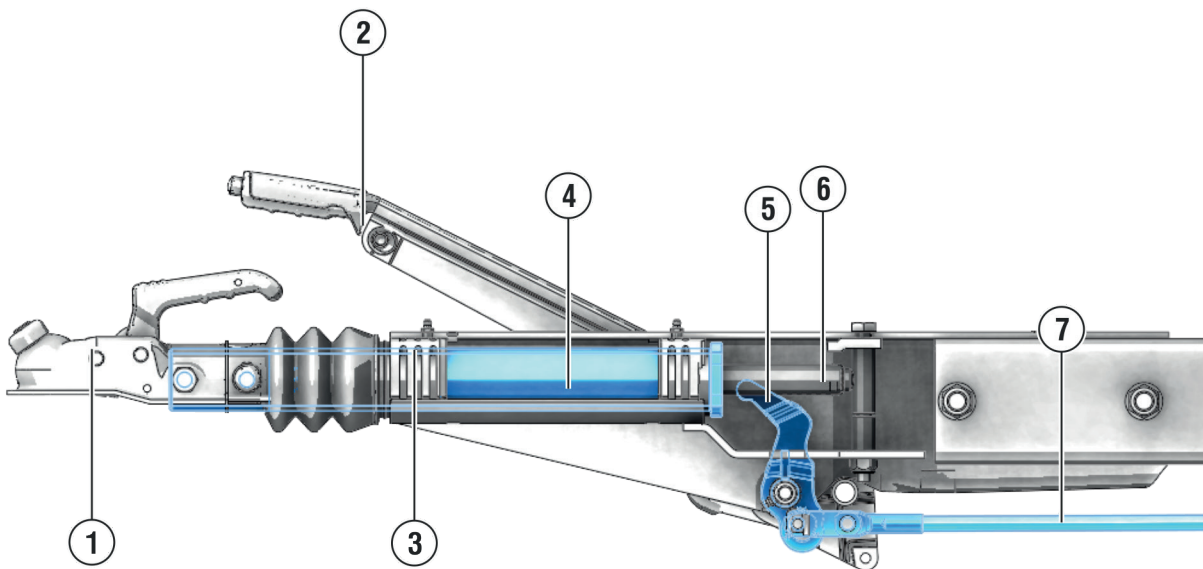
ATTENTION!

The prerequisite for the correct functioning of all braking processes and the functions is the correct setting and maintenance of the brake system!

Normal braking / overrun braking



1. The towing vehicle brakes or decelerates considerably
2. The centrifugal force of the trailer pushes further in the driving direction. A so-called overrun of the trailer takes place.



3. The drawbar tube (4) is pushed in and decelerated by the overrun damper (6).
4. The relay lever (5) is hinged and pulls on the brake rod (7)
5. The brake compensation is therefore centrally pulled forwards and actuates the two Boden cables.
6. The Bowden cable is suspended on the expanding joint lock and pulls this apart
7. The brake shoes press against the brake drum, the trailer decreases the speed

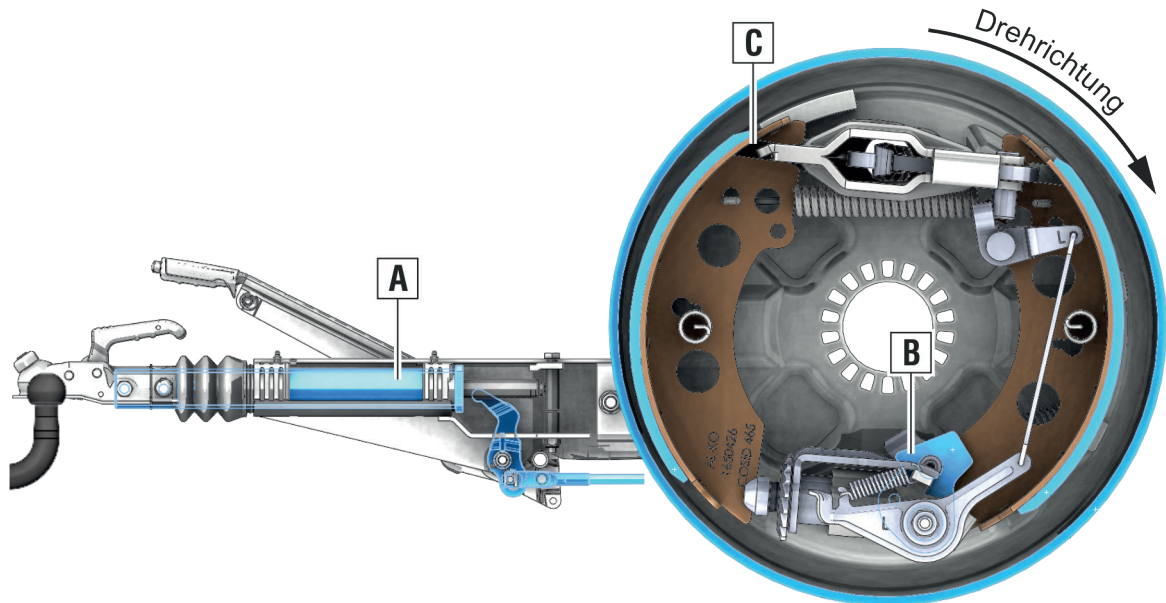
Automatic reverse lever or automatic reverse

The so-called AL-KO automatic reverse lever enables the driver to drive in reverse virtually without braking in spite of the overrun brake.



Gently!

so that the mechanics have time to switch over to the automatic reverse position, we recommend a gentle start in order to prevent a harder overrun shock.



ATTENTION! Risk of accident due to reversing!

Be aware of your surroundings when reversing and check first of all whether any third parties are in the danger area!

1. The drawbar tube **[A]** is also pushed in for reversing similarly to during the overrun. (Here by the maximum stroke of 87 mm)
2. Due to the changed direction of rotation of the wheel, the secondary brake shoe is now more loaded. It pushes the movable mounted automatic reverse lever **[B]** which lowers under the pressure of the brake shoe and the entire brake system, as shown on the illustration, is rotated/moved.
3. As such, the distance from the brake shoe to the servo stop is decreased. **[C]**

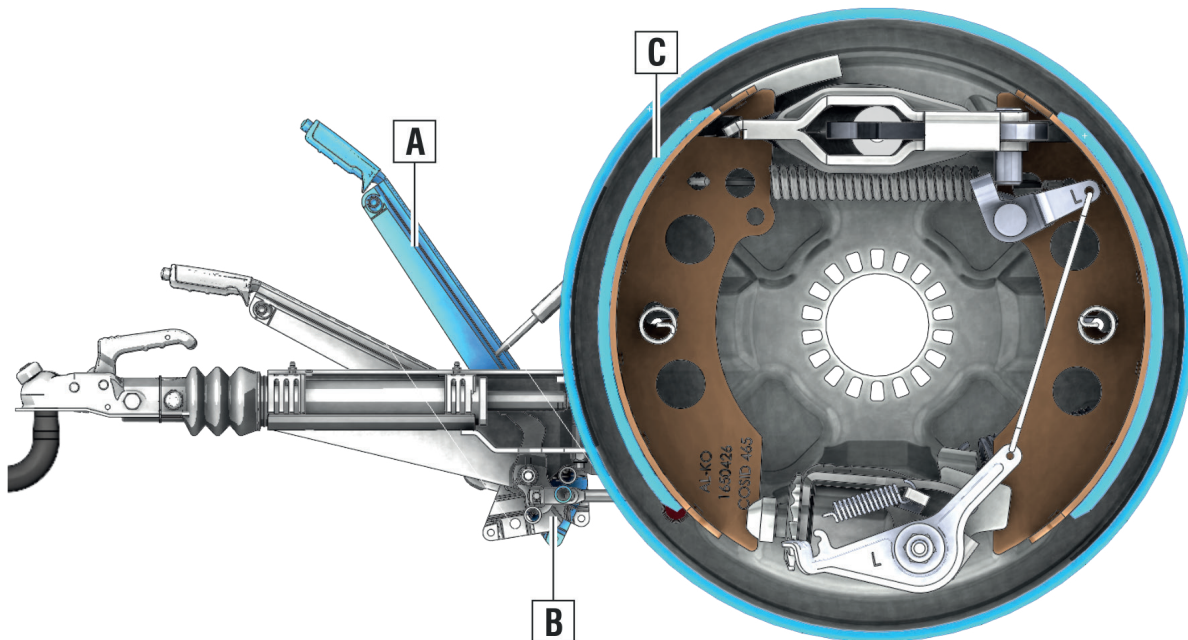


Historical knowledge

The old overrun brakes had a disadvantage: Whenever anyone wanted to drive in reverse, someone had to apply the handbrake on the trailer. Then one drove a little with the towing vehicle, so that a spring-loaded strap could be clamped at the rear. Once the handbrake was released, nothing stood in the way of reversing.

Parking brake forwards (handbrake)

Generally also known as a handbrake, this function prevents the accidental rolling away of the trailer. The handbrake can generate a greater tension path on the brake rod and therefore block the brake, due to the direct intervention in the brake system without the relay lever.



1. The handbrake lever is tightened beyond the slack point. [A]
2. It takes direct action at the brake rod [B]
3. The Bowden cables are tightened much greater than the value of the overrun brake, the brake shoes press against the brake drum. [C]



ATTENTION! Risk of accident due to handbrake not being released!

By driving with the handbrake applied, there is a high risk of an accident and serious damage may result. Fully release the handbrake prior to each journey.



Physical feature: Static friction

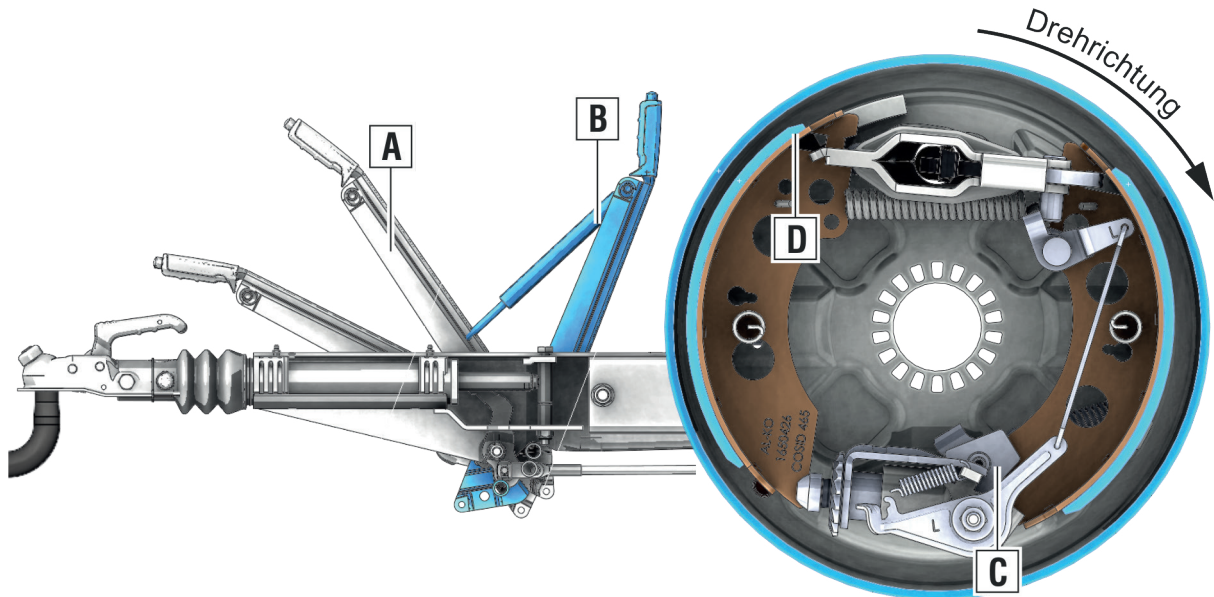
Did you know that the handbrake must legally hold 18% of the permitted gross weight? The trick here is static friction. As long as the trailer is stopped, this value is sufficient to prevent it rolling away independently.

This is where static friction comes into play. As soon as the trailer moves and is pulled, the static friction is converted to dynamic friction. It is therefore possible to move despite the handbrake being applied.

The excellent braking values of the AL-KO system can be found in the "Braking values" chapter on page 25.

Handbrake in reverse (backwards roll stop)

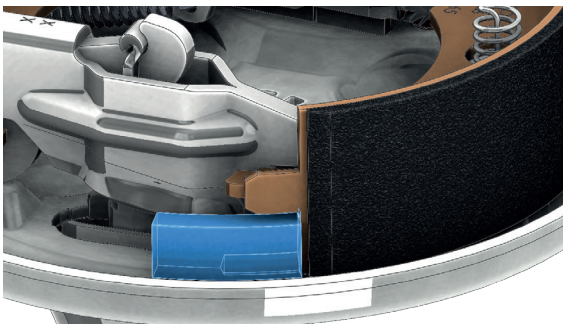
If the trailer is parked on a slope, for example, the same effect could occur as the automatic reverse due to the backwards roll movement: Despite the fact the handbrake is applied, the automatic reverse opens the brake and the trailer sets in motion. This prevents the AL-KO backwards roll stop:



ATTENTION!

The prerequisite for correct functioning of the backwards roll stop is the correctly adjusted and maintained brake as well as a handbrake lever tightened beyond the slack point!

1. Tighten the parking brake (handbrake) beyond the slack point. This can be felt if the gas spring starts to press the lever itself into position. [A]
2. The trailer begins to roll backwards
3. Similarly to the automatic reverse, the automatic reverse level fold up and makes way for the brake shoes. [C]
4. As the handbrake lever generates significantly more tension path beyond the slack point and the brake shoes are at some point present at the servo stop, the brake finally closes. [D]



At the servo stop, leveraging the brake shoes is now a thing of the past.

Correct adjustment of the brake system is therefore vitally important.

If the clearance is too low, the shoes may be present at the servo stop even during normal braking processes or reversing. The brake system blocks!

Emergency braking function or breakaway brake

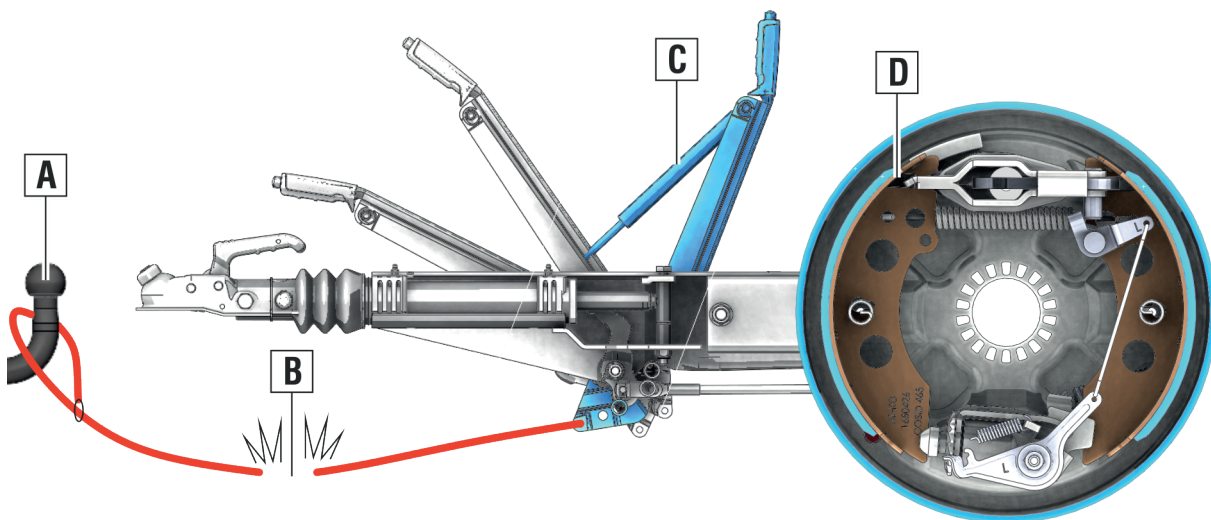
The breakaway cable is positioned with a loop and carabiner hook around the neck of the ball head coupling of the towing vehicle. If the trailer is unexpectedly released during the towing vehicle journey, the handbrake lever is actuated by the pulling action of the breakaway cable and the handbrake is applied.

The handbrake must be able to independently stop the trailer on a slope of 18 percent and a downhill gradient of 18 percent. This prevents the fact that the trailer continues to roll unbraked following an unexpected release, which cannot be ruled out with absolute certainty in the case of a malfunction or operating errors at the hitch.



ATTENTION!

To correctly attach the breakaway cable to the towing vehicle, local regulations are to be observed! Incorrect attachment can lead to severe penalties! Please observe individual European directives!

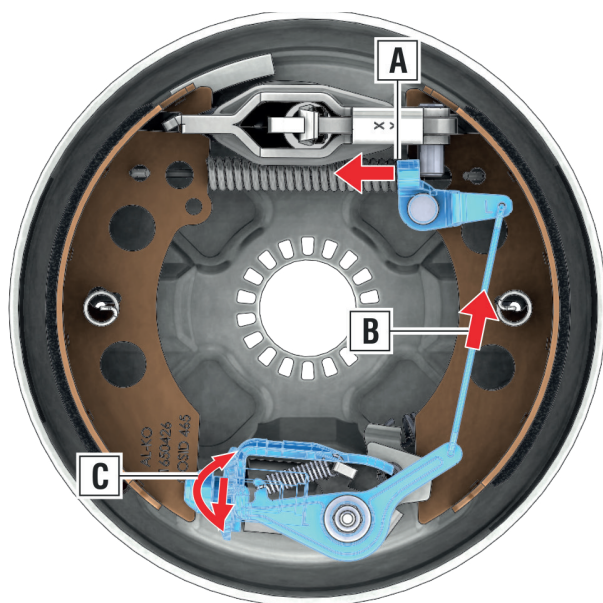


1. For example, the connection to the tow hitch is disconnected through incorrect locking of the tow hitch [A]
2. The breakaway cable is pulled and actuates the handbrake lever [C]. If the handbrake lever is fully applied, the tensile force is too great and the cable tears, meaning the trailer cannot continue to be towed. [B]
3. By applying the handbrake, full braking in the wheel brake is applied. [D]
4. Similarly to the backwards roll stop, rolling back is prevented by the large actuating path of the handbrake lever.

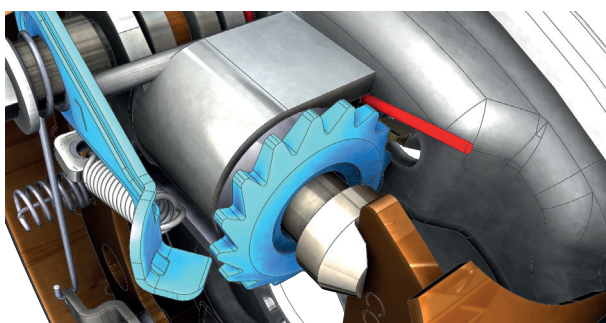
Function of the automatic brake adjustment AAA

In order to facilitate the continual checking of brake wear and the associated checking of the brake adjustment, a self-adjusting brake has been developed.

AAA stands for: **AL-KO Automatic Adjustment**



1. A minimum medium strength braking is presumed for the adjustment process.
2. The clearance is greater due to the wear of the brake pad.
3. If the wear is sufficient enough, the expanding joint lock is expanded further and presses against the small relay lever. [A]
4. In doing so, this pulls on the connecting wire [B]
5. The large adjustment lever is controlled by the connecting wire. Following braking, the spring retracts the adjusting lever, which rotates the adjusting nut one tooth further due to its shape. [C]



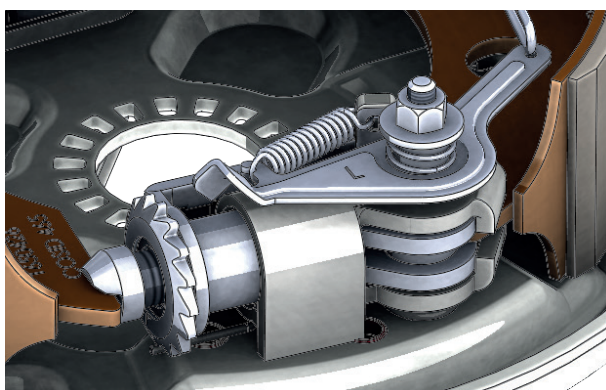
Shown in detail:

The adjusting nut takes action exactly at the adjusting nut and rotates one tooth further if the clearance is sufficient. The brake shoes therefore always have an optimal distance to the brake drum.

Braking always takes place with the same quality.



Regardless of whether the adjusting lever is in use, only the centred brake shoes can be used for assessment!



ADJUSTMENT WHEN REVERSING?

Even if the overrun braking is similar to an adjusting movement during reversing, it is not possible here that brake performs an adjustment.

The tension clip is moved by the automatic reverse lever and in doing so pushes the adjusting nuts out of the engagement of the adjusting lever.

3.6 Identifying wheel brakes

Decoding the designation



ECE test

All AL-KO wheel brakes are ECE-tested (official characteristic value) and can be connected to the corresponding AL-KO overrun devices (allocation calculation)

AL-KO wheel brakes are encoded with a simple code. The designation comprises the following components:

WB	20	5	1	AAA
this abbreviation stands for "wheel brakes"	Brake drum internal diameter in cm	Width of the brake pad in cm	Consecutively numbered version status	Additional designations for special types, such as self-adjusting or offset specification

Overview of wheel brakes

Type WB	Design	Perm. brake load per wheel brake	possible wheel connections **	Offset in mm	AAA availability
1636 G	a	375	1,2,3,4,11,12	27-45	
1636 G	b	375	1,2,3,4,11,12	0	
1637	a	500	1,2,3,11	27-33	
1637	b	500	1,2,3,11	0	
2051	Aa	650	1,2,3,4,5,6,7,8,11	26-33	YES
2051	Ab	750	2,7,8,9	30	YES
2051	Ac	650	1,2,3,4,5,6,7,8,11	0	YES
2051	Ad	750	2	0	YES
2361		900	2,4,6,7,8,9	30	YES
3062		1500	10	0 - -5	
3081	A	1250	10	0 - -5	
3081	B	2000	10	0 - -5	
2361 AR	Compressed air	900	2	30	
3062 AR	Compressed air	1500	10	0 - -5	
3081 AR	Compressed air A	1250	10	0 - -5	
3081 AR	Compressed air B	2000	10	0 - -5	

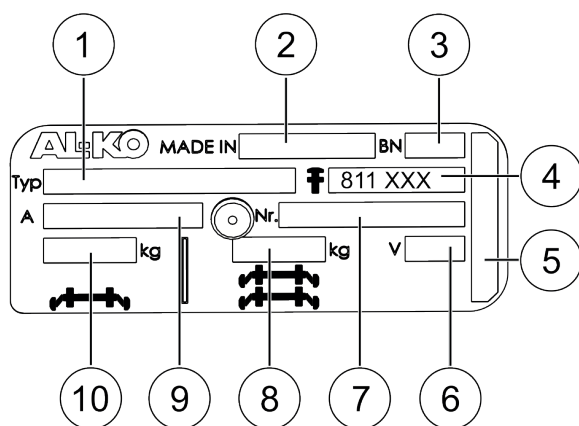
** 1= 100 x 4	2= 112 x 5	3= 98 x 4	4= 130 x 4
** 5= 108 x 4/5	6= 120 x 5	7= 130 x 5	8= 140 x 5
** 9= 139.7 x 4	10= 205 x 6	11= 101.6 x 4	12= 115 x 4

Brake type specification

Prior to commencing work, it is necessary to identify the wheel brake so you can order any potentially needed spare parts (such as brake pads or service set). You can use the marking on the brake back plate to detect which wheel brake is involved.

IDENTIFICATION OF THE AXLE TYPE PLATE

There is a type plate on the axle from which the spare part number (ETI No.) can be determined. All spare parts can be identified in the AL-KO spare parts list using the ETI No. and the indicated axle load. The AL-KO spare parts list is available for authorised specialist workshops at AL-KO Service.



1 Type designation and type

2 Manufacturer country

3 Manufacturing plant

4 ETI No. (spare part number)

5 Customer-specific text

6 Version

P = euro 1 axle

C = compact axle

S = standard axle /used and unused

T = Standard axle with torsion bar suspension

7 SAP material number

8 Permitted axle load for tandem axle

9 Order number

10 Permitted axle load

IMPRINTS ON THE REAR OF THE WHEEL BRAKE



ECE test number	Marking of components subject to approval
EC test number	Marking of components subject to approval
TYPE (e.g. 2051 des. A)	see "Encoding"
Permissible brake load	min. / optimum / max.
Manufacturer number	Customer-specific text
Markings for left and right brake back plate	Imprint or stamp
Wheel direction of rotation arrow	↑
Adjustment direction arrow	↑

Distinguishing between left and right brake back plate



ATTENTION!

A reversed installation results in reversing no longer being possible and even the backwards roll stop is out of operation.



The only reliable marking

Only imprints on the brake back plate as well as marking on the automatic reverse lever (L / R) are reliable indications for identifying the brake side.

All of the following indications, such as colour of the Bowden cable covers and dust caps can be removed or replaced by the body manufacturer, for example.



COLOUR OF THE BOWDEN CABLE COVERS

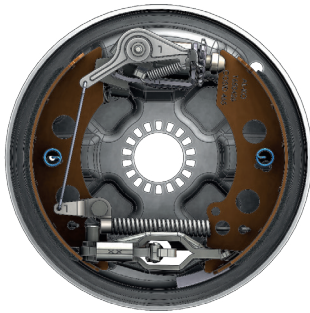


LEFT = white cover cap



RIGHT = red cover cap

POSITION OF THE BEARING PIN



The wheel brakes for the right-hand and left-hand sides of the axle (as measured in the driving direction) are different. Regardless of whether a wheel brake is intended for the left or right side, it can be most effectively detected at the position of the bearing pin of the adjusting housing.

Viewed from the front, the adjusting housing bolt is located on the left side of the adjuster unit on the left wheel brake (L), and on the right side on the right wheel brake (R). In addition, the wheel brakes are labelled on the rear of the brake back plate.

Distinguishing between Standard and AAA (self-adjusting brake)





A wheel brake **with** automatic adjustment is supplied with **red** cover caps.

Furthermore, during manual adjustment of the brake, the adjusting lever needs to be pushed upwards (see Chapter: Adjusting the brakes).

For this purpose, an additional opening is required. All AAA brakes therefore have **3 openings instead of 2**.



A standard wheel brake with manual adjustment is supplied with **green** cover caps

Only two openings are required for the adjustment.

AAA DUST CAP IMPRINT

The dust cap is provided with the following imprint:



This is the note for a self-adjusting brake. AAA= AL-KO Automatic Adjustment (Brake)



Dust caps are often removed by the body manufacturer and provided with their own label. It is therefore the most reliable method to view the brake back plate and its imprints or the number of drill holes.

4.0 WHEEL BRAKE - THE BASICS

4.1 Drum brake - specialist knowledge

Drum brakes are friction brakes which take effect with the brake pads on a cylindrical surface (the drums). When actuating the brake, the brake pad is usually pressed from inside against the circumferential drum. In motor vehicles, drum brakes have been replaced by disc brakes. In the case of less powerful cars, they are still used on the rear axle; in the case of heavy-duty commercial vehicles and trailers the drum brake is still state-of-the-art.

Advantages of the drum brake

- Due to the inner strengthening, only relatively low actuating forces are required. The measure for internal strengthening is the brake coefficient. Depending on the design, it is between two to five times the coefficient of friction. Consequently, a brake booster is not required for lightweight vehicles.
- The brake shoes are protected against coarser particles by their closed design. As a result, in current off-road vehicles and construction site trucks drum brakes are still predominantly used.
- Thanks to the inwards facing gap between the brake back plate and the brake drum, the rim is exposed to less abrasion (brake dust).
- Drum brakes are more durable than disc brakes. A number of maintenance manuals only provide inspection and removal of the brake drum to remove abrasion and rust in a larger maintenance interval and replacement of the brake shoes and small parts in a double interval.

Disadvantages of the drum brake

- In the case of drum brakes, the brake pad replacement is more laborious than with disc brakes.
- In contrast to disc brakes, drum brakes are more sensitive to fluctuations in the coefficient of friction. In standard cars up to the 1970s with drum brakes on the front axle this often led to vehicles going sideways or swerving during braking.
- At the same braking power - for a truck - a drum brake is heavier than a corresponding disc brake.
- The heat dissipation at highly loaded brakes is comparatively poor.
- At a high thermal load, fading occurs.

Why use drum brakes for trailers?

- In the case of long downtimes and infrequent use, disc brakes are more susceptible to rusting than drum brakes
- More economical to purchase and maintain
- More effective force is needed to generate the same brake force (e.g. with expensive hydraulics)

4.2 Braking values

Legally prescribed braking values

According to (EC) No. 661/2009 for central axle trailers type O2 to 3.5 tonnes.

Service brake system	≥ 50% (of the permitted gross weight)
Parking brake	≥ 18% (of the permitted gross weight)
Breakaway brake	≥ 18% (of the permitted gross weight)
Residual braking force at the automatic reverse lever	max. 8% (of the permitted gross weight)

Braking values of the AL-KO brake system

In comparison to the legally stipulated values, our brake system essentially works in a more effective and reliable manner than required by the legislator:

Service brake system	approx. 62% (of the permitted gross weight)
Parking brake	approx. 37% (of the permitted gross weight)
Breakaway brake	approx. 28% (of the permitted gross weight)
Residual braking force at the automatic reverse lever	max. 1% (of the permitted gross weight)

4.3 Brake temperatures

An important factor for the wheel brakes is the brake temperature. This sometimes drastically increases in the case of frequent braking.



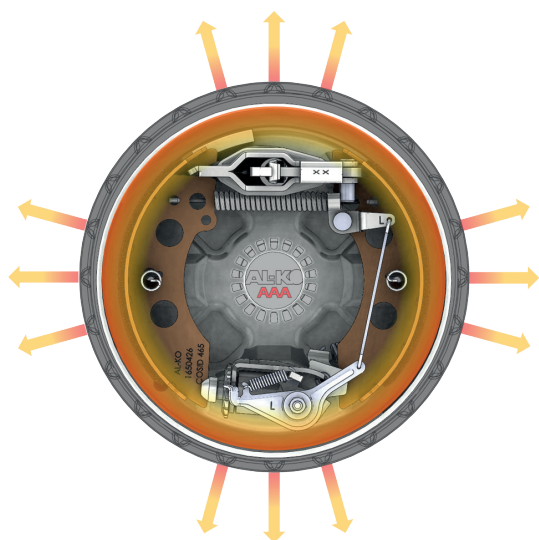
Hotter than you may think!

The brake pad and the construction of the drum brake is tested at approx. 100°C and is designed for temperatures beyond 100°C. Anything under 100°C is referred to as cold braking.

Temperature window

The temperature window refers to the range in which the wheel brake needs to work. The AL-KO wheel brakes, excluding the cold brakes, work between 100°C and 350°C. Even peak temperatures of around 400°C can be reached for a brief period.

Temperature profile and cooling



The required cooling, on the one hand, is achieved by the brake drum emissions (for some models via the cooling ribs), and on the other hand by circulating the motion air.

Depending on the heating curve, i.e. fast high temperatures or prolonged temperatures which are too high, a different pattern of errors or damage is formed.

In the case of continuous temperatures above 350°C, cooling by the motion air and the ambient temperature is more important.

Whereas brief fast temperature peaks emit a great deal of heat energy.

Effects of high brake temperatures

If a drum brake is regularly subjected to very heavy loads or an operating error has occurred (e.g. handbrake not fully opened), the brake may be damaged.



ATTENTION! Risk due to damaged brakes!

An incorrectly set brake, an operating error or poor driving can cause the wheel brake to overheat! Ensure that the brakes are regularly and properly maintained and that the brake system is corrected adjusted.

Following coupling, prior to each journey ensure that the handbrake lever is fully opened.

Damaged components on the vehicle may result in the wheel being lost!

WHAT IS A HOT BOX?

A hot box was initially a colloquial term which has become well known as the error cause for all problems associated with causing an overheated brake.



Always keep cool!

Why do the brakes sometimes heat up more strongly and in some situations suddenly and unexpectedly? In the "What the customer needs to know" chapter you will find out more about measures against these hot boxes.

If drum brakes are constantly exposed to high temperatures, this may cause the following effects.



The following table illustrates error patterns which are exclusively caused by excessive overheating!

■ Detachment of the brake pad	The brake pad is fitted to the brake shoe with a special adhesive. This design is suitable up to the normal operating temperatures. If the adhesive briefly heats up, the parts of the brake pad may become detached. If the brake heats up very strongly even for a longer period, the adhesive can be completely “baked on” and shred the entire brake pad.
■ Vitrification of the brake pads	Gas and resin may protrude out of the abrasive material due to temperatures which are too high, which in combination with heat results in vitrification of the brake pad. The consequence is a glass-like layer on the brake pad which does not produce a coefficient of friction. Nonetheless, dirt can also create a vitrification effect on the brake pad. In the worst case, the glazed brake pads need to be replaced. For this reason, gentle braking is particularly important.
■ Development of smoke and odours	Dirt, paint, plastics and coatings often have lower melting points than the maximum brake temperature. As such, strong heat development in the brakes often leads to smoke and odour development. In any case, the brake is then to be checked.
■ Declining braking power	If the pads are vitrified, the brake pad is shredded or the brake overheats, a clearly declining braking power can be noticed.
■ Noise emission	Declining braking power often goes hand in hand with noise emission, such as typical squeaking or rattling.
■ Grease leaking out of the wheel bearing	 ATTENTION! DANGER OF FATAL INJURY! At very high temperatures, this bearing grease can also ignite on the hot brake drum! A defective wheel bearing can result in the wheel being lost!
■ Defective wheel bearing	
■ Brake drum scoring	Following overheating, the brake drum often leaves traces: Deep scores or grinding points are formed.
■ Brake drum loss of shape	In the case of extreme temperatures, the brake drums can be deformed.



Causes of overheating and recommended measures

Find the proper handling in the chapter entitled “Error patterns and frequent misuse”.

4.4 Brake wear

Wear of the wheel brake is extremely important: No abrasion no braking! The wear is therefore to be checked during the regular maintenance intervals at the latest.



Take a look!

As the primary shoe needs to absorb the greater brake load during service braking, the spyhole for brake wear is located on the other side. As this brake shoe tends to be the most worn first of all.

Durability of the brake pad

It is not possible to state a specified value here. The following factors influence durability:

LOADING AND GROSS WEIGHT

Our wheel brakes are naturally designed and calculated for different weight classes of trailers. Nevertheless, it greatly depends on how the load is distributed and whether it is often driven with an overloaded trailer.

DRIVING STYLE AND DISTANCE PROFILE

Frequent, sudden or strong braking results in excessive wear. Even gentle downhill braking or driving with the engine brake results in the overrun brake being permanently activated. Even the distance profile, frequent driving, has an influence here: driving around mountains causes increased wear, while driving on the motorway has less wear.

THERMAL LOAD

In close connection with driving style and distance profile is also the thermal load of the brake. If the wheel brake has been driven very hot and is cooled down again with a cooling zone (without strong braking or engine brake), the brake pad regularly burns out during full braking.

BRAKE ADJUSTMENT

Correct adjustment and maintenance of the entire brake system significantly contribute towards the optimum functioning and therefore service life. Due to an incorrect setting of the brake system, the wear pattern of the brake pads (contact surface of the friction pads on the brake drum) as well as the adjuster can be negatively affected. In particular, a non-optimised wear pattern can cause a local thermal overload of the pads and therefore considerably reduce the service life of the brake.

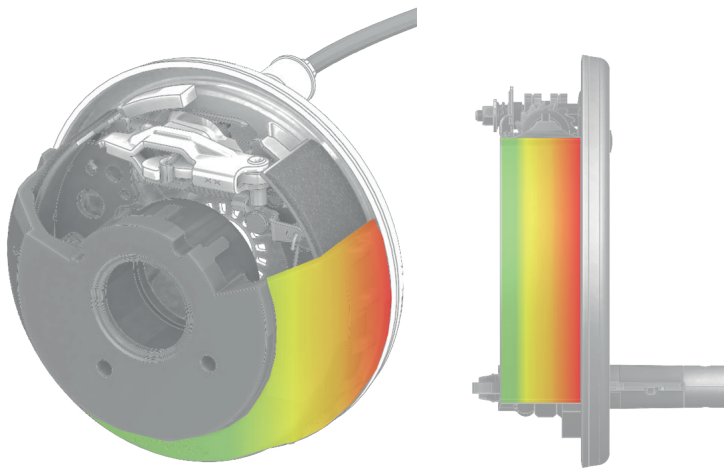
Brake wear on the self-adjusting AAA brake

Self-adjusting brakes offer a high degree of safety due to the automatic compensation of the brake pad wear. In addition to the optimum braking distance, such systems offer a high level of comfort with regard to the overrun behaviour of the trailer.

With regard to the wear behaviour, an optimally adjusted conventional brake does not differ from a self-adjusting brake, as these are subject to the same effective force and load conditions.

In the case of non-optimally adjusted conventional brakes, the reduced brake power of the trailer is compensated for by the brake system of the towing vehicle. Of course, a lower wear pattern is developed on the trailer brake, which can be incorrectly mistaken for higher downtimes.

Slanted brake shoes



The brake drum heats up during braking.

Due to the geometry of the drum, it heats up more on the side of brake back plate than the side near the rim. Reason: More material in the vicinity of the hub takes longer to heat up

Heat is generated on the friction pad between the brake pad and drum.

At the warmest point, the pad “burns” faster. The brake pad is slanted.

4.5 Brake pad

The brake pad of our wheel brakes is a protected composition and is therefore not released for publishing.

The BK 6516 and COSID 465 pads have been tested according to the same criteria at our site and correspond to the legal requirements as well as our further quality requirements.

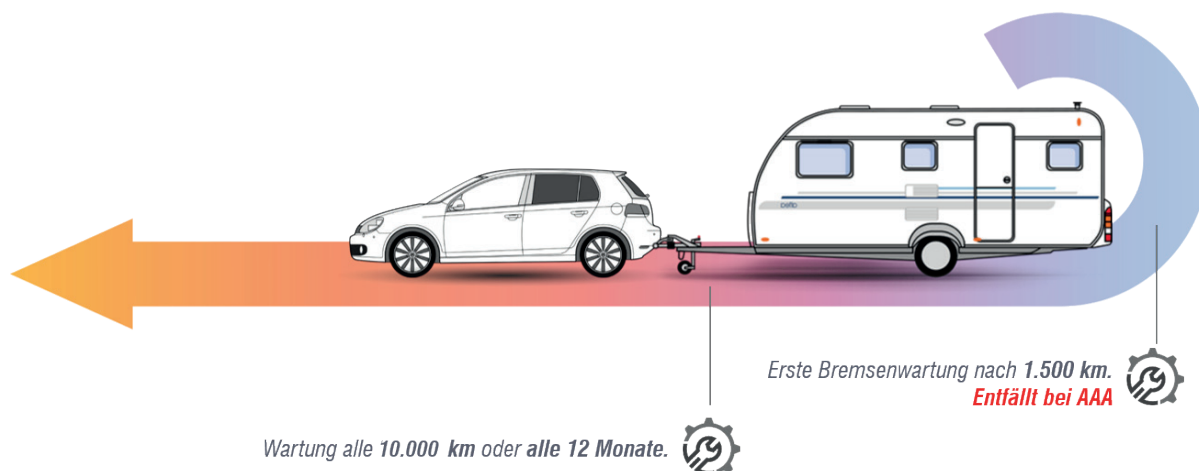
This has been inspected several times in tests to gain approval for the pads and in numerous internal tests.

Both pad qualities are included in the type approval of the brake and can be optionally used.

Even if the pads differ in terms of their appearance, it is ensured that the function, brake performance and wear are in the same tolerance field.

We do not add any non-ferrous metals to the brake pads and therefore avoid corrosion.

5.0 MAINTENANCE



ATTENTION! DANGER OF FATAL INJURY DUE TO FAULTY WORK

- All of the work described in this guide may only be carried out by properly trained technical personnel!
- For work on the brakes on public roads, a certain degree of training and care is required.



ATTENTION! Only a correctly adjusted and regularly maintained brake system fulfils the criteria of an approved functional brake!

An incompletely or incorrectly maintained or adjusted brake may have the following consequences:

- The braking power is no longer sufficient
- The brake blocks
- Automatic return function is deactivated
- The brake overheats
- Brake wear is too high
- Noises such as squeaking or creaking occur
- The self-adjusting brake is not adjusted cleanly
- Emergency devices such as the backwards roll stop and hand-brake no longer function accordingly!

5.1 Maintenance intervals

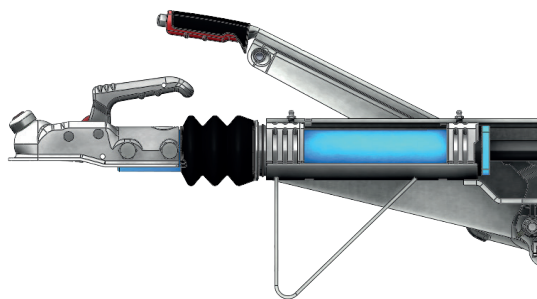
It is essential that the maintenance intervals are complied with:

- Initial brake maintenance is due at a mileage of 1,500 km. This is not required for the AAA
- Thereafter, full brake maintenance must be performed every 10,000 km or every 12 months.

5.2 Checks prior to maintenance

Checks to the brake adjustment

CHECKS TO THE OVERRUN DAMPER



1. Push the drawbar tube by hand
2. The overrun damper slowly pushes the drawbar tube out again independently.



The damper is OK if the drawbar tube slowly pushes itself out again.

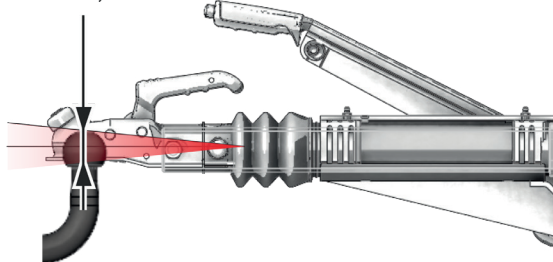
If the drawbar tube remains pushed in, the overrun damper is defective.



Installation and removal of the overrun damper is described in the "Overrun device XXXXX" document.

CHECKING THE BEARING CLEARANCE

max. $\pm 1,5\text{mm}$



1. The drawbar tube is positioned in a cartridge or between two polyamide bushings.
2. At the coupling point, the towing hitch may move up and down by 1.5 mm.

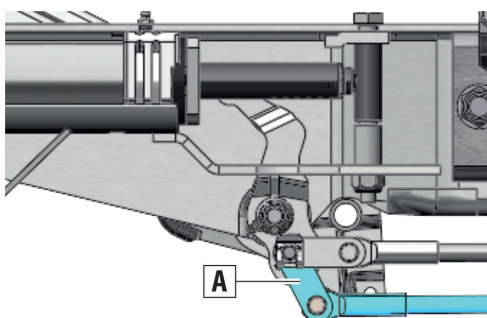


The bearing bushes need to be replaced if the so-called bearing play is above this value.



Replacing the bearing bushes is described in the "Overrun device XXXXX" document.

CHECKING THE BRAKE ROD



1. Visual inspection of the brake rod. In the case of a released handbrake, the brake rod should be extended.
2. The connection profile [A] to the relay lever should be in parallel to the drawbar.



If the rod sags as shown in the illustration, the brake system definitely needs to be reset!

CHECKING THE BRAKE ADJUSTMENT



The clearance

The clearance is the distance between the brake pad and the brake drum in an unactuated state.

Driving with too low a clearance can result in the brakes juddering and noises in the brake system. Permanent damage to the brake components caused by selective overheating and resulting deformations, vitrification and cracks is not to be ruled out.

Throughout the service time of the brake, the clearance theoretically continually increases due to the wearing components. Automatic wear adjustment devices in the brake system ensure automatic compensation.



1. Tighten the handbrake lever.
2. Rotate both wheels in the forwards direction.



The two wheels must not turn. If only one wheel can turn, the clearance in the brake is too great.



If the clearance is too great (for example, due to worn or incorrect components or an incorrectly adjusted brake), long actuating paths and the delayed build-up of the braking force result in longer braking distances.



1. Release the handbrake lever
2. Rotate both wheels in the forwards direction.



Both wheels must be able to turn. If one wheel is difficult to turn or even blocks, the clearance is too low



If the clearance is too low, there is a risk that the two friction partners will come into contact with each other even when the brake pedal is not pressed, thus leading to undesirable residual torques. This can lead to increased fuel consumption, unnecessary wear and high temperatures.



1. Lightly apply the handbrake lever.
2. Turn both wheels backwards.

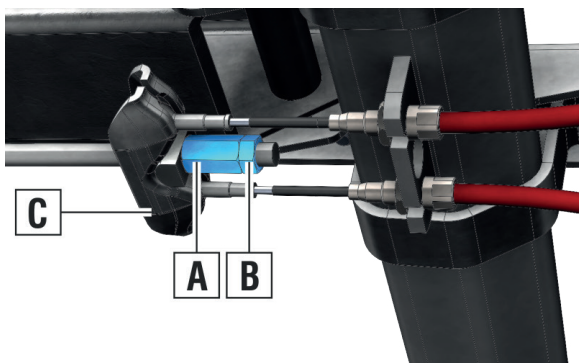


If a "banging" can be heard, then the wheels are blocking. The automatic reverse and backwards roll stop are therefore working. The brake adjustment is presumably correct.

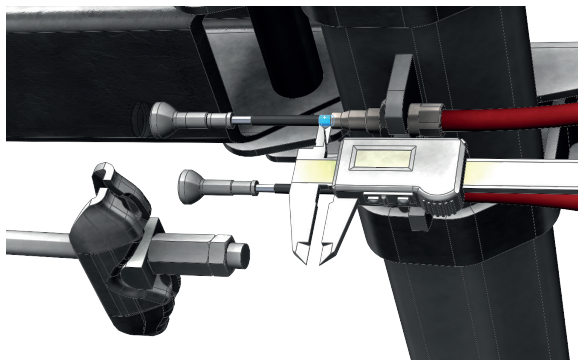


This method rules out reverse brake obstruction in the case of retrofitting the AAA. If the wheels are not turning backwards, the brake back plates are presumably the wrong way around.

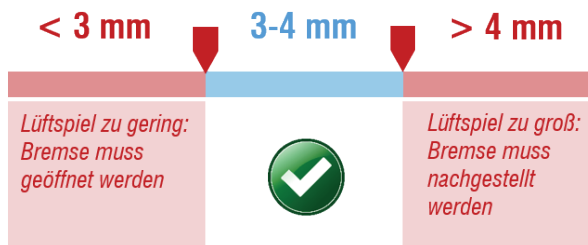
CHECKING THE CLEARANCE ON THE BOWDEN CABLES



1. Release the counter nut [B].
2. Loosen but do not remove the adjusting nut [A].
3. Suspend the compensation profile from the Bowden cable heads.



1. Effortlessly pull on the Bowden cables.
2. The Bowden cables should be pulled out 3 - 4 mm.



The clearance must be the same on both sides!

CHECKING BRAKE WEAR



1. Remove the cover cap from the wear test opening.
2. In the case of a pad thickness **< 2 mm**, the pad must be replaced.



This opening is only used for a swift check. The pads usually run irregularly, so at a marginal residual pad layer, remove the drum and check the entire surface of the pad!



Replacing the brake shoes is described in the "Service manual XXXXX" document.



SUMMARY OF THE BRAKE ADJUSTMENT CHECKS

- ☒ Overrun damper and bearing play of the drawbar tube checked
- ☒ Clearance of the wheels checked and function of the handbrake
- ☒ Automatic reverse function checked
- ☒ Clearance checked on the Bowden cables
- ☒ Brake wear checked

5.3 Maintaining the wheel brake



The dismantling and assembly of the wheel brake is described in the following document: Wheel brake 695099 service manual

The dismantling and assembly of the wheel brake **with AAA** is described in the following document: Wheel brake service manual 695102



ATTENTION!

Observe the temperature resistance of the lubricant! The lubricating grease must have a temperature resistance from -30°C to +600°C.

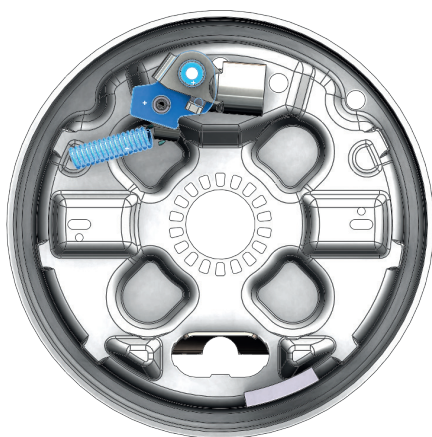


ATTENTION!

If the brake pads have a pad thickness < 2 mm in one or more places, they need to be replaced! In doing so, observe our service manual wheel brake 695099 or for brake shoes AAA 695102



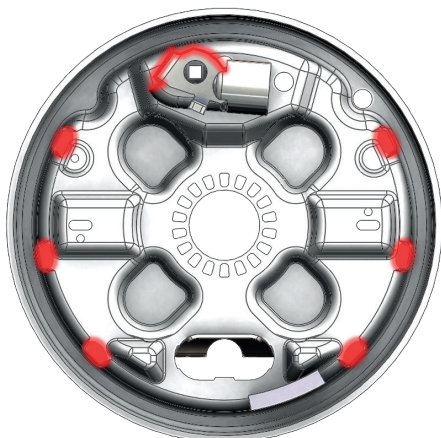
1. Check brake pads for wear and replace if necessary.
2. Fully dismantle the brake back plate and remove any dirt with the brake cleaner.



1. Grease the automatic reverse lever and the inside of the housing so that the automatic reverse lever can move easily.
2. Check the springs, replace if necessary.
3. Lubricate bearing pins at the bearing point and re-install the automatic reverse lever.



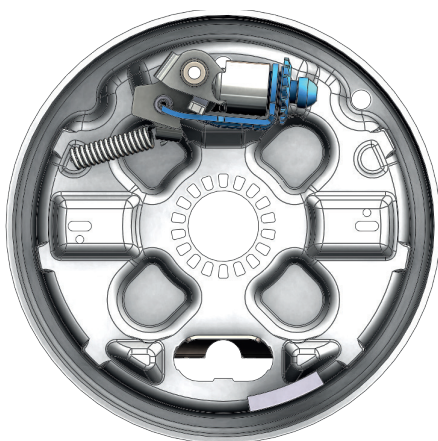
Lubrication of the automatic reverse lever is critical to the correct functioning of the automatic reverse!



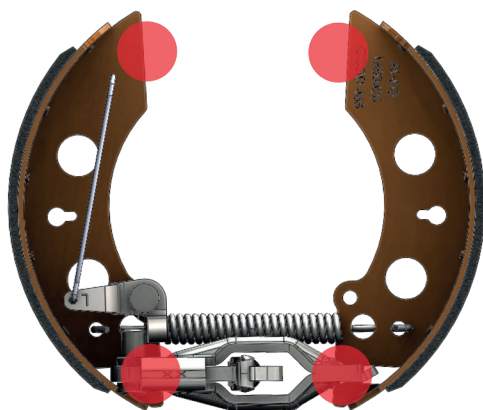
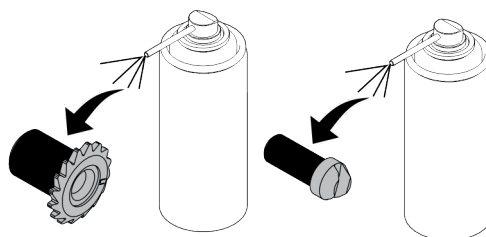
1. Lubricate bearing points of the brake shoes on the brake back plate.



The contact surfaces of the brake shoes can be clearly recognised: They are constantly in motion due to the floating mounted shoes. Brake squeaking or other noises often occur from here.



1. Grease the bearing point of the adjusting nut in the adjusting housing.
2. Grease adjusting nut and adjusting screw at their bearing points.



1. Grease the bearing point of the expanding joint lock at the brake shoes.
2. Grease the bearing points of the brake shoes at the adjuster unit.



ATTENTION!

In the case of maintaining the AAA, remove any dirt on and below the adjustment lever. Ensure the correct installation position is selected and refer to instructions in the service manual!



SUMMARY OF WHEEL BRAKE MAINTENANCE

- ☑ Check the brake pads and replace, if necessary
- ☑ Brake cleaned and dismantled
- ☑ Automatic reverse bearing points lubricated
- ☑ Bearing points of the brake shoes lubricated on the brake back plate
- ☑ Bearing points of the adjuster unit lubricated
- ☑ Adjuster unit dismantled and lubricated

5.4 Checking the brake drum



Disassembling the brake drum is described in the XXXXX service manual.



1. Remove brake drum.
2. Check the contact surface of the brake pad for deep scores or damage.
3. Check wheel bearing for damage and dirt.



If damage is detected on the brake drum or wheel bearing, these components need to be replaced!

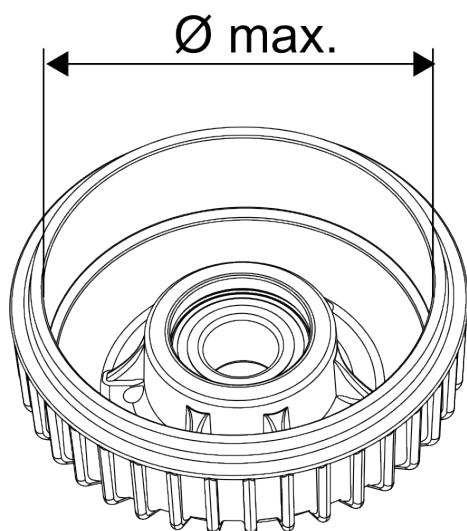


The wheel bearing must only be replaced once! The bearing seat widens with each press process.



To perform a check yourself, hammer a small grain into the bearing seat if you want to replace the wheel bearing for the first time. As such, anyone who wants to check the drum can see when a new brake drum needs to be installed.

4. Checking the internal diameter of the brake drum



The brake drum also shows wear over time and must be replaced when the minimum measure is no longer met.



ATTENTION!

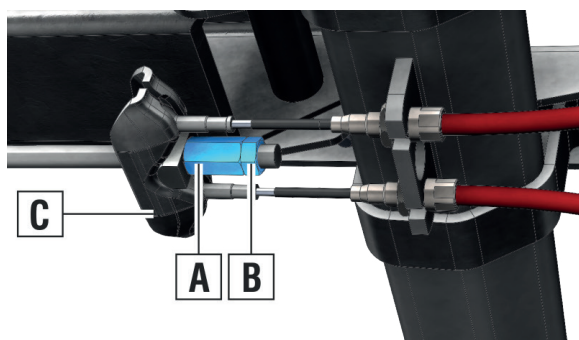
Replace the brake drum if the maximum brake drum diameter is reached or exceeded as otherwise brake malfunctions or brake failure may occur!

Wheel brake type	Diameter
WB 1637	max. 161 mm
WB 2051	max. 202 mm
WB 2361	max. 232 mm
WB 3062	max. 303 mm
WB 3081 A/B	max. 303 mm

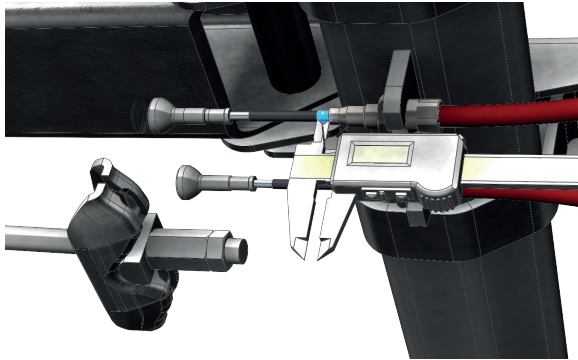
5.5 Performing the brake adjustment



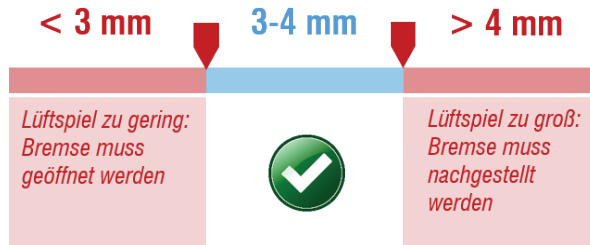
Adjustment of the brake is described in service manual 695101.



1. Release the counter nut [B].
2. Loosen but do not remove the adjusting nut [A].
3. Suspend the compensation profile [C] from the Bowden cable heads.



1. Effortlessly pull on the Bowden cables.
2. The Bowden cables should be pulled out 3 - 4 mm.



The clearance must be the same on both sides!

Adjusting the clearance

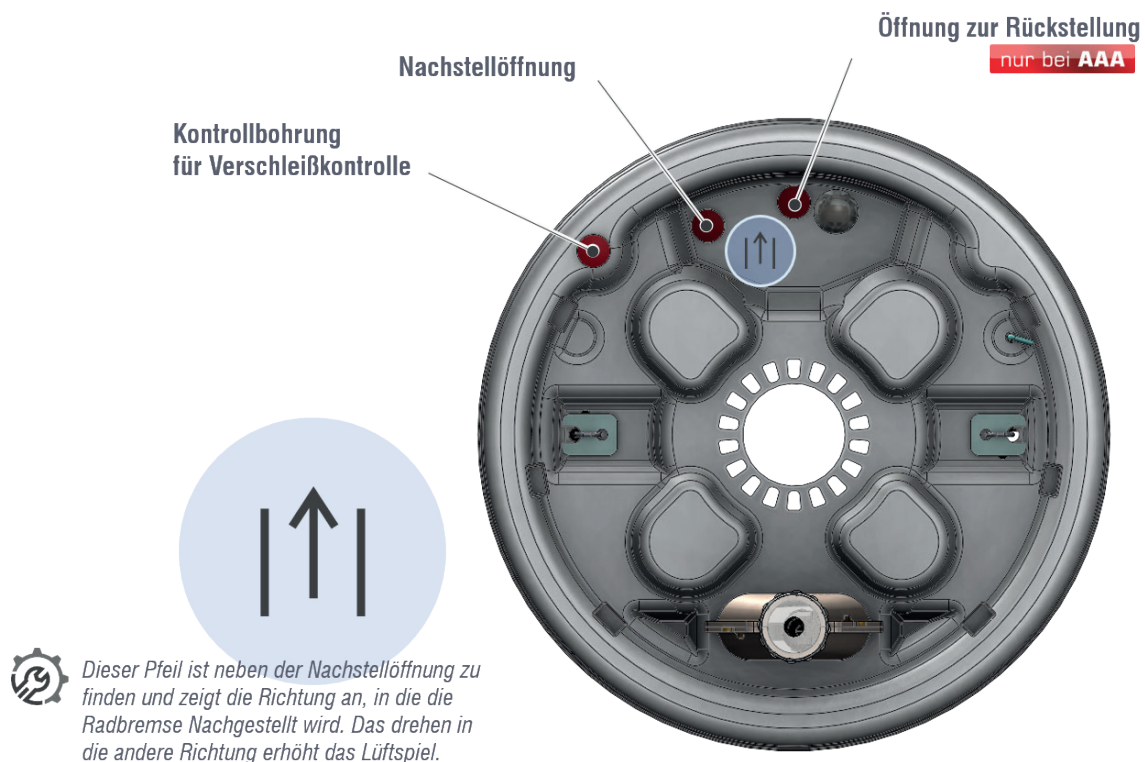


The clearance

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Throughout the service time of the brake, the clearance theoretically continually increases due to the wearing components. Automatic wear adjustment devices in the brake system ensure automatic compensation.

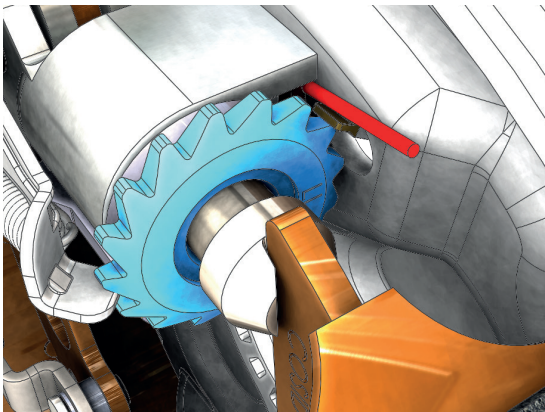
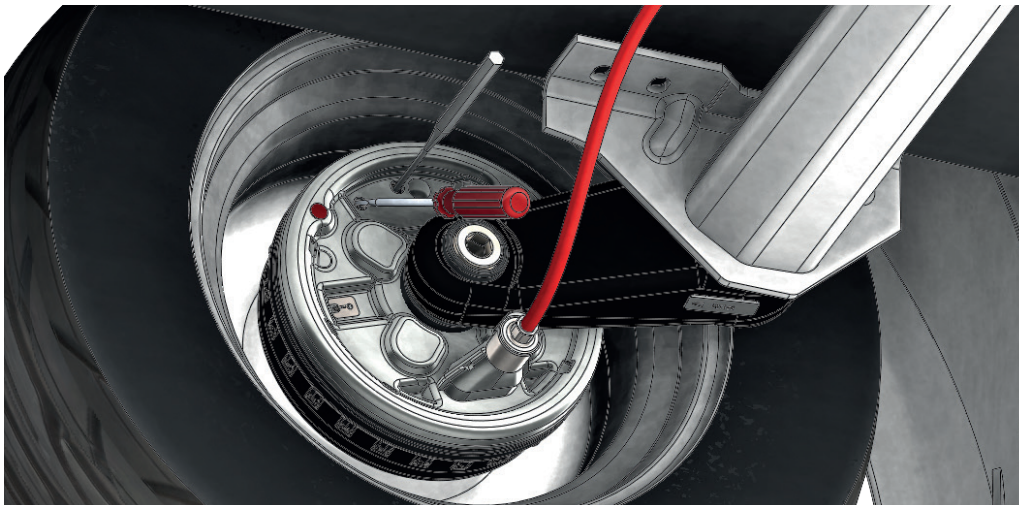


ATTENTION!

Take note of the adjustment direction! Turning in the wrong direction can make the brake ineffective or cause it to block!

Adjusting the brake (standard brake)

The wheel brake is adjusted (manually) via the rear of the brake back plate. To do so, you need a screwdriver and a punch, if necessary.

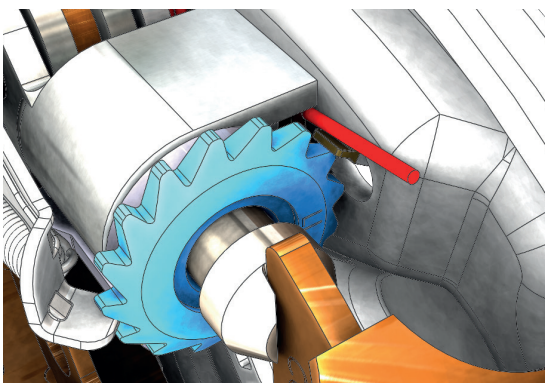


1. Remove the cover from the adjustment opening.
2. Using a screwdriver, turn the adjusting nut **in the arrow direction** to decrease the clearance. (e.g. in the case of wear)
3. Regularly check the clearance as described below under "Performing the brake adjustment".



One tooth on the adjusting nut has approx. 0.4 mm clearance on the Bowden cables!

Resetting / opening the brake (standard brake)



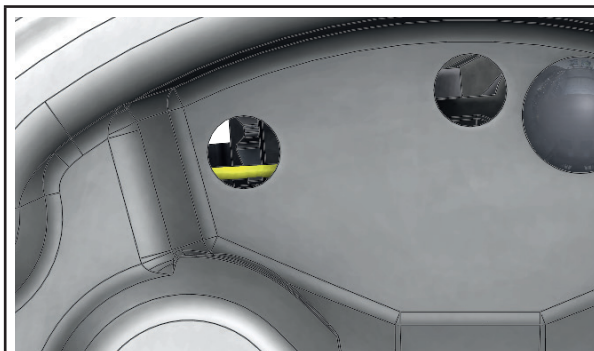
1. Remove the cover from the adjustment opening.
2. Using a screwdriver, turn the adjusting nut **against the arrow direction** to increase the clearance. (e.g. in the case of new pads)
3. Regularly check the clearance as described below under "Performing the brake adjustment".

Adjusting the brake (with AAA)

CENTRING BRACKET AND ADJUSTING LEVER

The self-adjusting brake AAA has an adjusting lever which is permanently engaged in the adjusting nut. Furthermore, the adjuster unit has been centred by the centring bracket in its bearing seat since 2019.

Whether such a centring bracket is present can be detected by a visual inspection:



The adjustment opening enables the centring bracket to be seen (shown here in yellow).

Furthermore, an imprint can be read on the edge of the brake back plate about the adjustment opening: **WNK-01**



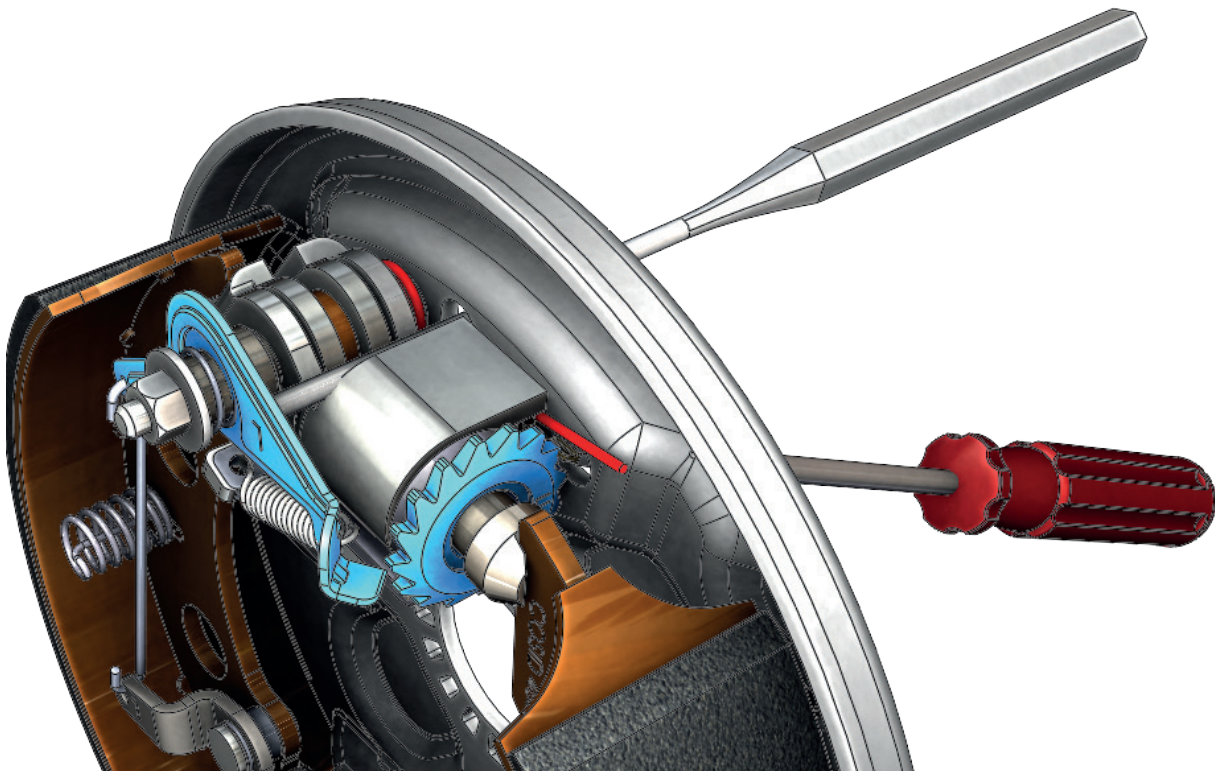
What does this centring bracket do?

After 5 successful years on the market with more than 300,000 units sold, the performance of the AAA wheel brakes has been further improved.

Components have been improved and an additional component, the centring bracket, integrated. The conversion of the AAA wheel brakes will take place in the first half of 2019.

The update offers these additional advantages:

- Increased resistance to improper maintenance and operation
- Protection against operating errors during manual adjustment while servicing
- Optimum behaviour of the adjustment in all driving situations
- Improved basic adjustment of the wheel brake in case of retrofitting
- Standard for all WB2361 AAA and 2051 AAA

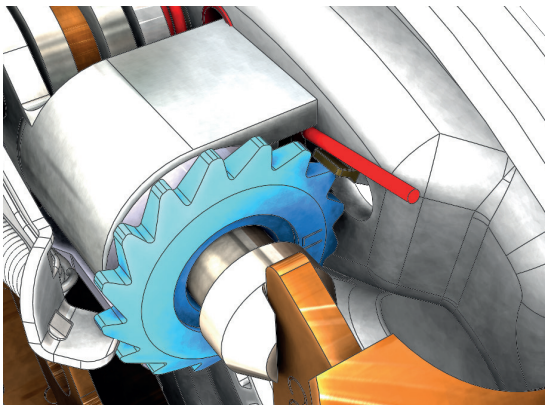


1. Remove the cover from the adjustment opening and from the special adjustment opening of the AAA.
2. Using a screwdriver, turn the adjusting nut **in the arrow direction** to decrease the clearance. (e.g. in the case of wear)
3. Regularly check the clearance as described below under “Performing the brake adjustment”.



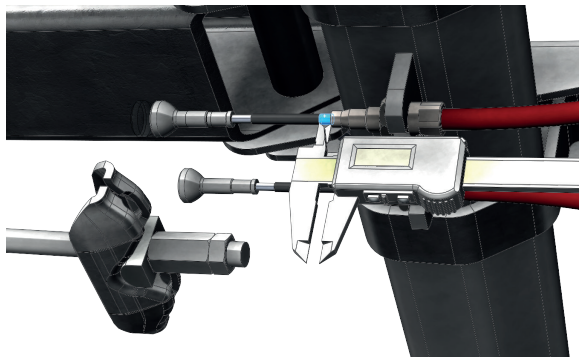
One tooth on the adjusting nut has approx. 0.4 mm clearance on the Bowden cables!

Opening the brake (with AAA)

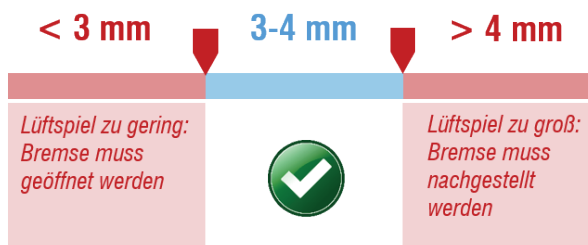


1. Remove the cover from the adjustment opening.
2. Lift the adjusting lever with the punch
3. Using a screwdriver, lift the centring bracket upwards and at the adjusting nut turn **against the arrow direction** to increase the clearance. (e.g. in the case of new pads)
4. Regularly check the clearance as described below under “Performing the brake adjustment”.

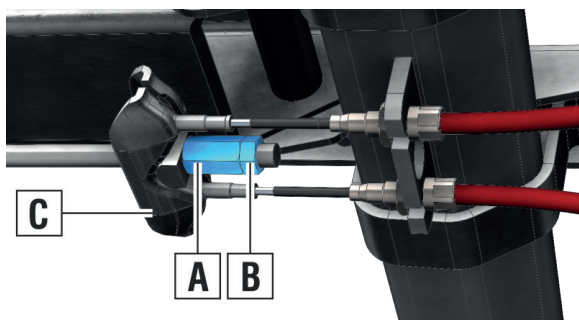
Completing the brake adjustment



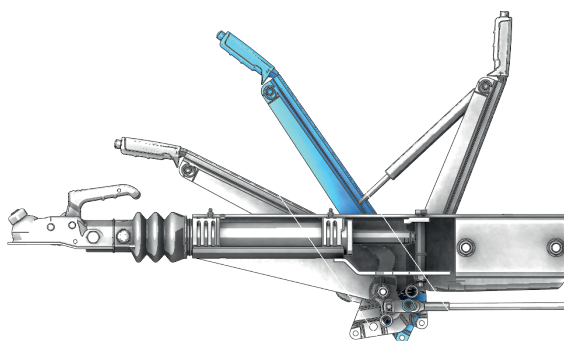
1. Effortlessly pull on the Bowden cables.
2. The Bowden cables should be pulled out 3 - 4 mm.



The clearance must be the same on both sides!



1. Release the counter nut [B].
2. Loosen but do not remove the adjusting nut [A].
3. Suspend the compensation profile [C] from the Bowden cable heads.



1. Actuate the handbrake lever several times
 2. Leave the handbrake lever slightly applied
 3. Turn the wheels backwards
- ☒ The handbrake lever should tighten automatically
 - ☒ If a “banging” can be heard in the wheels of the automatic reverse lever, then the wheels are blocking.
4. Release the handbrake lever
 5. Turn the wheels forwards
- ☒ The wheels should be able to effortlessly turn forwards.

6.0 PROPER HANDLING

6.1 Fields of application

Proper use

Our axles and wheel brakes are designed for use in both the private and commercial sectors. They are only envisaged for the attachment to braked trailers. Our wheel brakes must be tailored to the gross weight of the trailer and only work correctly in the specified weight range.

Regular maintenance and inspection of the brake adjustment is the basic prerequisite for smooth operation.

Frequent misuse

Misuse	Error pattern
■ Driving overloaded	■ Damage to the wheel bearing ■ High level of tyre wear on inside of tyre (for trailing arm axles) ■ Detached brake pads due to overheating ■ Rolling away instead of backwards roll stop (gross weight too high for the handbrake)
■ Driving with poorly adjusted brake	■ Brake does not engage, "pushes" trailer ■ Brakes worn on towing vehicle ■ Brake overheats due to continuous gentle braking ■ Automatic reverse not working as the automatic reverse lever cannot fold out ■ Handbrake does not hold the stipulated gross weight
■ Insufficient maintenance	■ Brakes squeaking ■ Noises during driving ■ Adjuster is blocked with dirt, brake is not automatically adjusted (AAA)
■ Driving with collision damage (e.g. kerb - wheel bearing defective)	■ Tyres worn on one side ■ Vibrations and noises ■ Heat development through to wheel loss

6.2 Knowledge about trailer driving

Nose load and loading

The right loads plays a decisive role when it comes to trailer driving. The nose load is predominantly the deciding factor here. This should always be set to the maximum. At higher speeds, a maximum nose load reduces the swinging movement of the trailer.



What actually is the nose load?

Nose load is the force acting at trailers without sufficient axle centre distance (e.g. car trailer with only one axle or an axle centre distance less than 1 meter, semi-trailer, central axle trailer) on the towing hitch of the towing vehicle. The manufacturers of trailers and towing vehicles specify maximum permissible nose loads. The lower of the two values defines the maximum permissible nose load.

Permitted nose loads for car vehicle combinations are usually in the range of 50 kg to 100 kg, while for agricultural machinery, construction machinery and trucks they are a maximum of 2 tonnes, provided that they are moved within the scope of German road traffic regulations / German vehicle licensing regulations (StVO / StVZO).

The German legislator prescribes a minimum nose load of 4% of the actual gross weight of the trailer for standard car vehicle combinations; but it must not exceed 25 kg (§ 44 StVZO (German vehicle licensing regulations)).

THE CORRECT NOSE LOAD

Too high or too low a nose load will impair the road holding and may even lead to you losing control of the vehicle.

Measuring the nose load

Use a special jockey wheel scale or position the jockey wheel of the trailer, disconnected from the vehicle, on your own scales.

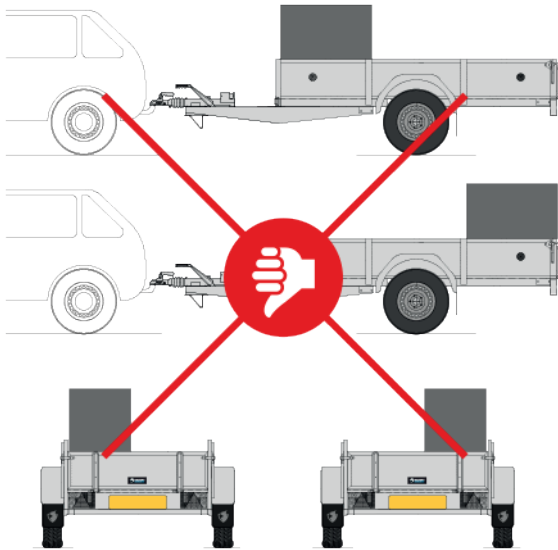
If the **nose load is too low**, the weight exposure in the rear part of the trailer is too high. This leads to the following problems:

- The vehicle combination is unstable and tends to swing.
- The braking distance is exceeded.
- The range of dimmed lights is decreased
- For vehicles with rear-wheel drive, the road holding is reduced.

If the **nose load is too high**, the weight exposure in the front part of the trailer is too high. This leads to the following problems:

- Other drivers are dazzled by the dimmed lights.
- Steering is impaired.
- For vehicles with front-wheel drive, the road holding is reduced.

LOADING

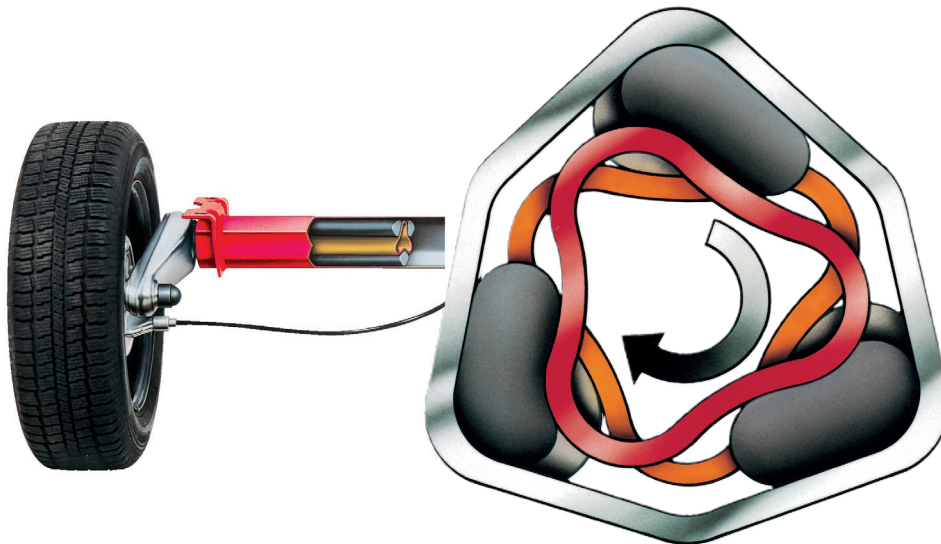


The following points are to be observed for the trailer load (both commercial trailers and leisure trailers):

- Distribute the load as evenly as possible.
- Position the heavy loads directly on or just in front of the axle (the wheels) on the trailer.
- Where possible, utilise the maximum nose load
- Single-sided loading causes damage to the vehicle and negatively affects the driving dynamics

Axle, camber and track

FUNCTION AND DESIGN OF THE AXLE

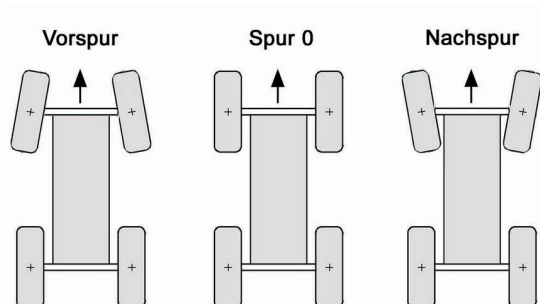


Each wheel has an independent suspension system in the axle beam so that independent wheel suspension occurs. The swing arms connect the axle stubs with the triangular inner tubes in the axle beam. Loading the vehicle causes the triangular inner tubes to twist compared to the hexagonal outside tube. The rubber spring elements are deformed during deflection and achieve a high level of inherent damping.

CAMBER AND TRACK

AL-KO axles are set by default with a toe-in of + 10 minutes to +30 minutes.

Furthermore, the camber is set in such a way that the trailer reaches the optimum camber value when loaded. All of our axles are therefore briefly loaded with the camber and track being measured during production.



Schematic representation of the toe-in:

Thanks to the toe-in adjustment, the axles achieve the tyre abrasion values which are comparable with those of the car. The axles must therefore be installed trailing.

6.3 Brake calculation

The combination of overrun device, wheel brake, axle and tyres must be calculated for a complete report and in order to assess the braking power.

This calculation needs to be performed by the manufacturer of the overrun device.

For example, if the tyre size changes, the entire vehicle combination needs to be examined here again in its entirety.

A brake calculation is obligatory for trailer approval!

6.4 Payload increases

A payload increase is the increase in the permitted gross weight with consistent unladen weight at vehicles following their approval.

A payload increase enables the greater loads to be transported. In the case of caravans or trailers, the space available can be utilised more effectively in this way. In vehicle classes taxed by weight, however, a payload increase may be accompanied by an increased vehicle tax.

Furthermore, in some vehicle classes adjustment to the insurance tariffs may be necessary. An increased gross load often goes hand in hand with a decreased maximum speed.



ATTENTION!

AL-KO is only able to perform payload increases following approval from the vehicle manufacturer! For this purpose, the customer must request the drawing number from the body manufacturer and obtain its approval!

Our payload increase enquiry form can be found online at:

<https://www.alko-tech.com/de/kundencenter/anfrage-gewichtsaufleistung>

In the "Checklists for everyday use" section, you will find a checklist for payload increase in the caravan area

6.5 FAQs

Tyre wear

The towing properties of the trailer, as well as the tyre wear, are also influenced by the construction, size, load capacity and rubber compound of the tyre itself. Even the tyre inflation pressure plays a very important role here.



Did you know that...?

At AL-KO, each axle is subjected to an axle load simulation during final installation? Here, compliance with the specified values for track, camber and suspension travel is tested = 100 % final check.

PHYSICAL REASONS

Since a trailer does not have its own drive, it is passively moved, which means that the trailer is literally "pulled" around the curves by the towing vehicle. The longer the overhang, i.e. the pulling movement of the towing vehicle fails, the more intensely the tyres "rub down" in the transverse direction.

GROSS WEIGHT

In the annual traffic inspections performed by the police it transpired again and again that over 70% of the inspected trailers are driven overloaded. By exceeding the axle load as well as the large load differences between the left and right axle, the track and camber values are greatly influenced. This automatically leads to increased tyre wear.

AIR PRESSURE

If the air pressure of the tyres is not adjusted when driving at higher axle load, the tyres are - in terms of wear - exposed to double the load. Particularly in the case of commercial trailers, the weight changes drastically: while during loaded journeys the permitted gross weight is generally utilised, during empty runs the tyre pressure is often too high.

DRIVING STYLE AND SPEED

Different driving styles and routes, as well as driving speeds of the vehicle combinations naturally also influence the tyre wear. Collision on kerbs or driving over potholes at excessive speed may change the geometry of the axle or damage it, which may also lead to increased tyre wear.

QUALITY OF TYRES

It is often the case that only a poor tyre is the reason for excessive wear. Ensure suitable tyre load specifications and good quality ones are used.

ENGINE BRAKE

In contrast to the braking behaviour on the car, intensive use of the engine brake - especially when driving downhill or on cross-country routes - is not a driving response to reduce wear. The trailer is constantly in so-called overrun braking which means continual braking for the tyres

Durability of the wheel bearings

According to design conditions, the service life of our wheel bearing is up to 250,000 km. Depending

on the application and conditions, this can inevitably vary greatly.

- Relevant influencing factors include:
- Road conditions
- Application / purpose
- Weathering
- Load / loading
- External effective force / collision and accidental damage

STANDARD SERVICE LIFE	CHALLENGING CONDITIONS	UNUSUALLY HIGH WEAR
(Caravan and commercial trailer in central European road conditions, no or negligible overload, normal year-round operation, etc.)	(Commercial trailer with overload, construction sites, off road, etc.)	
100,000 km to 250,000 km	50,000 km to 100,000 km	Under 50,000 km

Brakes squeaking

The brakes squeaking can be caused by a number of factors.

- A high level of play in the wheel brake, especially when new, the components are faster and it creates greater play in the wheel brake, the components move into self-oscillation faster and it can lead to this noise formation.
- A not yet complete wear pattern of the brake pads can be produced once they have worn in
- Surface or joint changes to the friction pads (glazing of the pads) caused by thermally high load
- Even in the case of the brake components being permanently underload, the surface of the pad can be changed detrimentally
- Exceeding or omitting the specified maintenance intervals, lubrication points are dry



In new vehicles or in vehicles where new brake shoes were installed during maintenance work, the inspection or adjustment / re-adjustment of the brake system is more important than for vehicles whose brake system is already fully running and set. Indeed, it is also important that all movable and mounted components are applied with high temperature-resistant lubricant.



An end to the squealing!

Our examinations have shown that in exceptional cases, especially with "underload" brakes, the squeaking may remain or recur because another running-in takes place and wear behaviour is reflected in the brake components. A remedy with a special lubricant from the motorcycle high-performance brake sector or car sector has produced very good results for a number of customers.

PROCYCLE – Brakes with anti-squeal paste (10004882)

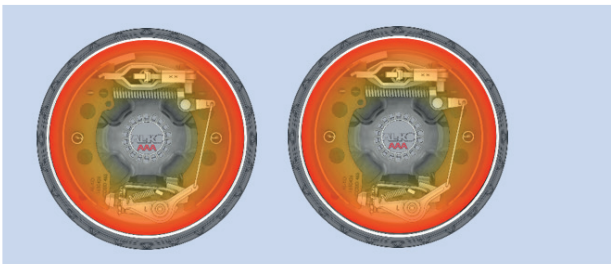
ROCYCLE – ceramic paste (10038268)

LIQUI MOLY – Brakes with anti-squeal paste (manu. No.: 3077)

Use of this paste has been tested and approved by us, but must be performed according to the attached lubrication chart*.

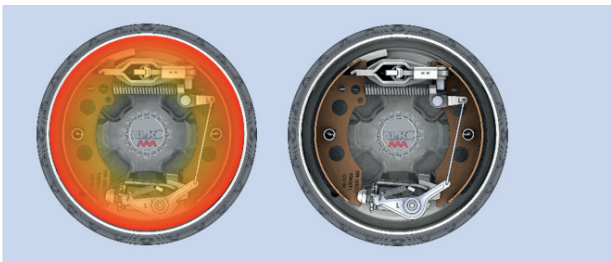
Brake temperature / hot box

The influencing factors for overheated brakes are described in detail in the "Brake temperatures" chapter.



Zentraleinleitung – Beide Bremsen laufen heiß

- Bergabfahrlilfe im PKW aktiviert
- Handbremshebel nicht vollständig gelöst
- Auflaufdämpfer defekt
- Bremsgestänge / Bremse falsch eingestellt
- keine ausreichende Kühlpausen / Fahrstil



Einseitige Einleitung – Eine Seite läuft heiß

- defekter Bowdenzug
- betroffene Radbremse zu streng eingestellt
- keine original Bremsbacken von AL-KO verbaut
- defektes Radlager
- Belag an der Verschleißgrenze
- Belag hat sich gelöst (bei längerer Maximaltemperatur)



Do not touch!

Customers describe often experiencing very hot brake drums or rims after driving uphill or frequent braking.

Touching parts may be painful, but we humans find 70 °C hot! As the drum brake temperatures may reach up to 350°C, it is not possible to reliably check the temperature by hand - and can in the worst case cause burns!

DISTINGUISHING FEATURES FOR HOT BOXES

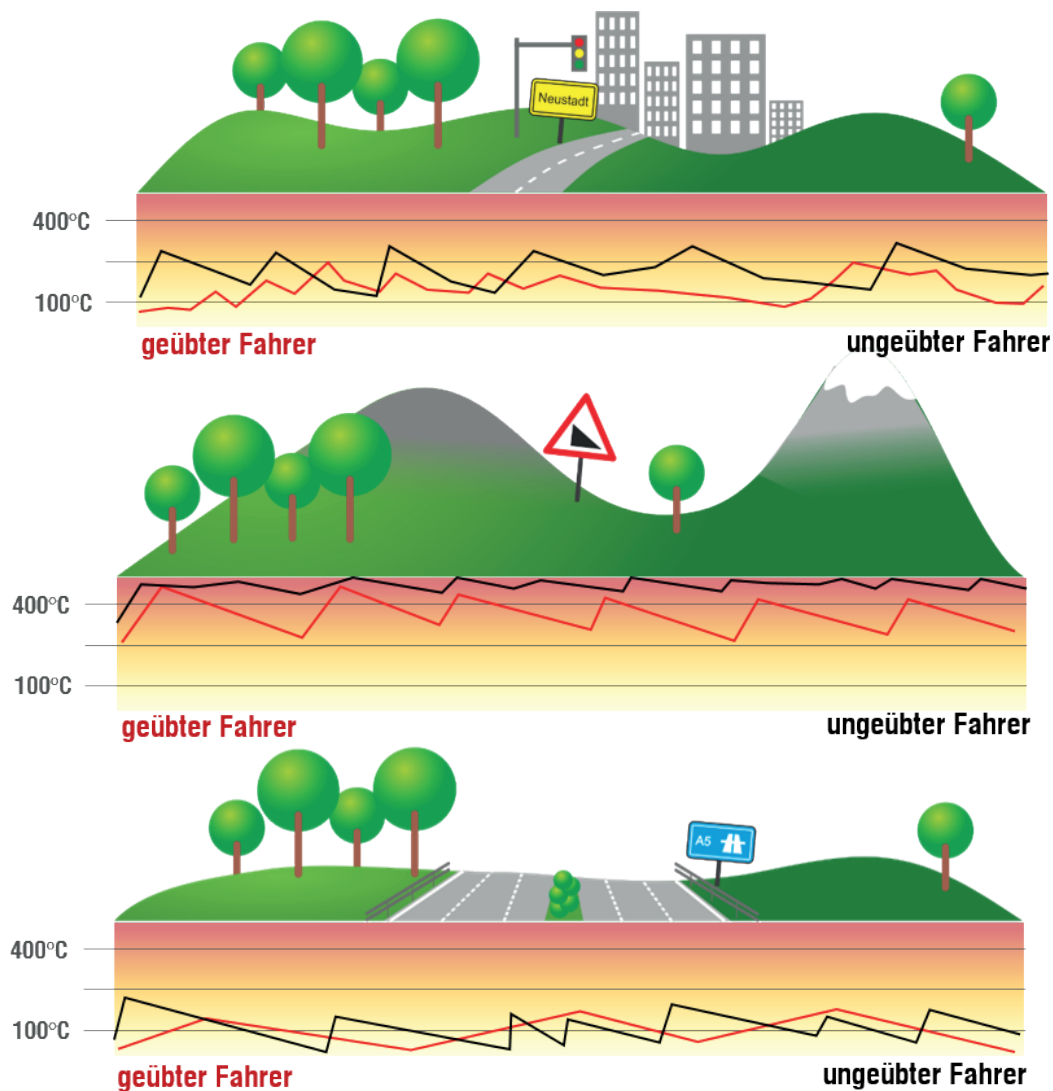
- Brake shoes - the brake pad has detached itself from the pad carrier completely or in fragments
- Overrun colours on the brake shoes are bluey-black
- Pad surface damaged (vitrified)
- another consequence: if this temperature or higher is maintained for longer periods, the adhesive properties change or the adhesive bond dissolves and the brake pad becomes damaged (destroyed)

DRIVING STYLE GENERATES COOLING

Particularly in modern towing vehicles and their driving aids, problems on trailers are often only very difficult to detect.

While the driving downhill aid lets the trailer continually overrun, the drum brake brakes increasingly hotter. The cooling breaks, which were previously inserted, are eliminated with the effective cooling systems in the towing vehicle. The consequence is that the trailer brake overheats faster.

In the chart, the temperatures are clearly influenced by the driver:



7.0 CHECKLISTS

CHECKLIST FOR PAYLOAD INCREASES



ALOIS KOBER GMBH
Kundenservice Fahrzeugtechnik
Ichenhauser Straße 14
D-89359 Kotz

Absender
Straße
PLZ / Ort
E-Mail
Telefon
Fax
Datum

Ansprechpartner bei AL-KO
Herr Peter Lerner
Telefon: +49 8221 / 97-8563
Fax: +49 8221 / 97-8550
E-Mail: peter.lerner@al-ko.de

CHECKLISTE ZUR GEWICHTSERHÖHUNG BEI AL-KO FAHRGESTELLEN

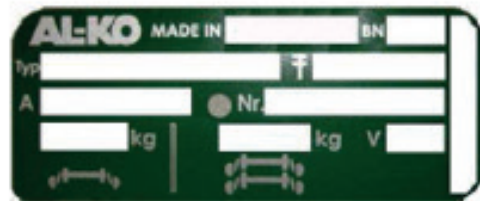
CARAVANHERSTELLER
CARAVANMODELL
FAHRZEUG-IDENT-NR.
SERIEN-NUMMER
TAG DER ERSTEN ZULASSUNG
ZULÄSSIGES GESAMTGEWICHT
GEWÜNSCHTES ZUL. GESAMTGEWICHT
RANGIERSYSTEM VORHANDEN ☐ Ja, Hersteller / Modell
☐ Nein



1. Achse

Daten vom Achstypenschild (in der Mitte der Achse aufgenietet/geklebt)

☐ Einachs ☐ Tandem



(Abbildung ähnlich)



2. Radbremse

Typ der Radbremsen (auf der Rückseite des Bremsankerblechs eingepreßt)

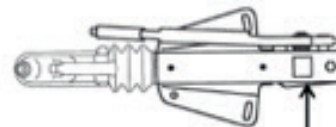
AL-KO Kober Typ Ausf. ...
zul. Bremslast kg



3. Auflaufeinrichtung

Typ und Ausführung der Auflaufeinrichtung (in Höhe des Handbremshebels eingepreßt)

Auflaufeinrichtung
AL-KO Ausf. ...
GA ~ kg
EG Pr.-Nr.~.....~.....



4. Zugverbindung

Typ und Gewichtsbereich der Holme (auf dem rechten Holm im vorderen Drittel eingepreßt)
An durchgehenden Rahmen ist keine Typeinprägung vorhanden!

AL-KO Kober Zuggabel Typ
zul. Gesamtgew. d. einachs. Anh. kg
Ausf. ... Prüfz. ~ M



5. Reifengröße

Montierte Reifengröße (aus dem Fahrzeugschein oder von den Reifen, z.B. 195/70 R15)

AL-KO

QUALITY FOR LIFE

