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<th>Code</th>
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<td>Adaptor cone</td>
<td>AK05</td>
</tr>
<tr>
<td>Floor bushing for plug-in anchor</td>
<td>BB03</td>
</tr>
<tr>
<td>Diagonal wheel hub rods</td>
<td>DRST05</td>
</tr>
<tr>
<td>Wheel adaptor</td>
<td>FA05</td>
</tr>
<tr>
<td>Wheel adaptor, complete assembly</td>
<td>FA05K</td>
</tr>
<tr>
<td>Fixation bearing</td>
<td>FL05</td>
</tr>
<tr>
<td>Fixation screw and spring washer</td>
<td>FS05</td>
</tr>
<tr>
<td>Thread adaptor</td>
<td>GA05</td>
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<tr>
<td>Slide rails for sliding anchor</td>
<td>MS03</td>
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<tr>
<td>Wheel hub fixation</td>
<td>RNF</td>
</tr>
<tr>
<td>Wheel hub rod</td>
<td>RST05</td>
</tr>
<tr>
<td>Wheel bolt</td>
<td>RS05</td>
</tr>
<tr>
<td>Sliding anchor</td>
<td>SA03</td>
</tr>
<tr>
<td>Sliding anchor, height adjustable</td>
<td>SA05H</td>
</tr>
<tr>
<td>Sliding anchor, height adjustable</td>
<td>SA05HM</td>
</tr>
<tr>
<td>Sliding anchor, height adjustable</td>
<td>SA05HL</td>
</tr>
<tr>
<td>Sliding anchor, short</td>
<td>SA03K</td>
</tr>
<tr>
<td>Sliding anchor, long</td>
<td>SA03L</td>
</tr>
<tr>
<td>Sliding anchor cart</td>
<td>SAW03</td>
</tr>
<tr>
<td>Slide/plug-in bracket</td>
<td>SSK03</td>
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<tr>
<td>Conical spring washer</td>
<td>SS05</td>
</tr>
<tr>
<td>Rod holder</td>
<td>KR03</td>
</tr>
<tr>
<td>Rod holder for 4 rods RNF</td>
<td>SHR05</td>
</tr>
<tr>
<td>Plug-in anchor</td>
<td>STA03</td>
</tr>
<tr>
<td>Plug-in anchor, short</td>
<td>STA03K</td>
</tr>
<tr>
<td>Plug-in anchor, short</td>
<td>STA04K</td>
</tr>
<tr>
<td>Plug-in anchor, long</td>
<td>STA03L</td>
</tr>
<tr>
<td>Plug-in anchor cart</td>
<td>STAW03</td>
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<tr>
<td>Connecting screw and spring washer</td>
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1. General

1.1 Purpose of the operating manual
This manual “Wheel Hub Fixation” describes the construction and function, mounting, demounting, maintenance and cleaning as well as transport and storage of the wheel hub fixation. The wheel hub fixation described here fixes the test vehicle using adaptors, bearings, rods and anchors onto a roller or flat-roadway dynamometer.

The wheel hub fixation has been developed and built by S. Bleyer GmbH Schorndorf.

1.2 Target group
This manual “Wheel Hub Fixation” addresses operators of dynamometers for automobiles who have prior technical knowledge.

1.3 Version
The footer on each page contains the current version and the date of printing of this manual “Wheel Hub Fixation”.

You always can download the latest version of this manual from www.s-bleyer-gmbh.de.

1.4 Safekeeping
Make sure that you keep the operating manual safely!

1.5 Copyright
© 2017 S. Bleyer GmbH, 73614 Schorndorf, Germany

All rights reserved. Reproduction of this manual, even in parts, no matter by which process, is prohibited without prior written approval from S. Bleyer GmbH.

The content of this release was carefully checked for correctness. Nevertheless, errors cannot be completely excluded.

Subject to change without prior notification.

Design and text: S. Bleyer GmbH. All photos and drawings are the property of S. Bleyer GmbH. Photos and drawings need not represent the current production status as long as the function illustrated is the same.

Printed on 100% recycled paper.
1.6 Language of the operating manual
The original version of this operating manual has been written in the EU official language of the manufacturer of this incomplete machine. Translations into other languages are translations of the original version. The legal stipulations of the machinery directive apply to these.

1.7 Address of manufacturer
S. Bleyer GmbH
Steinbeisstraße 20
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info@s-bleyer-gmbh.de
www.s-bleyer-gmbh.de

1.8 Explanation of the symbols
Levels of danger are identified per ISO 3864 or ANSI Z535.4

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>!</td>
<td>Danger</td>
</tr>
<tr>
<td>!</td>
<td>Warning</td>
</tr>
<tr>
<td>!</td>
<td>Caution</td>
</tr>
<tr>
<td>!</td>
<td>Notice</td>
</tr>
<tr>
<td>!</td>
<td>Important</td>
</tr>
</tbody>
</table>

The triangular warning symbol with the signal word “danger” stands for an imminent danger, that definitively leads to serious injuries or death.

The triangular warning symbol with the signal word “warning” stands for a potentially hazardous situation, that could lead to serious injuries or death.

The triangular warning symbol with the signal word “caution” stands for a potentially hazardous situation, that could lead to minor injuries.

The triangular warning symbol with the signal word “caution” also stands for a hazardous situation in which the product or an object in the vicinity is damaged (material damage).

The round warning symbol with the signal word "Notice" stands for a potentially hazardous situation in which the product or an object in the vicinity could be damaged (material damage).

The hand with the signal word "important" gives advice and hints for use.
2. Description

2.1 General view

Figure 01: Complete fastened wheel

[4] wheel hub rod (RST)  [8] thread adaptor

2.2 Intended use

The task of the wheel hub fixation is the fast, tension-free and safe fixation of passenger cars with front wheel, rear wheel or four wheel drive on various roller or flat-roadway dynamometers using the wheel hub as fixation point.

The following vehicle types can be fixed:
- standard passenger cars
- heavy duty vehicles
- prototypes
- experimental vehicles
- vehicles without towing hitch
Possible areas of use are:
- crest roller dynamometers in uniaxial and biaxial use (e.g. 48-inch roller)
- double roller dynamometers in uniaxial and biaxial use (e.g. 20-inch roller)
- flat-roadway dynamometers

Intended use:
Only use the wheel hub fixation to fix vehicles on a roller or flat-roadway dynamometer in accordance with the intended use and the Technical Data.

Part of the intended use is also:
- observe and follow this manual
- observe maintenance instructions

Danger of life and risk of material damage around the vehicle!
Death, serious injuries or material damage are caused by non-intended use of the wheel hub fixation.

Follow all instructions for mounting and demounting, maintenance and cleaning precisely, as well as all safety instructions!

### 2.2.1 Limits for tensile load for wheel hub fixation and hook fixation

**Limits of tensile load:**

**Range up to max. 10,000 N tensile load:**
Only hook fixation is necessary here.

**Range up to max. 20,000 N tensile load:**
A mixed use of hook fixation and wheel hub fixation is allowed, if:
- One axle is equipped with a wheel hub fixation and
- the opposite side is fastened with a hook fixation.

**Range over 20,000 N up to max. 30,000 N tensile load:**
Here it is essential that wheel hub fixation is used on both axles.

### 2.2.2 Danger Zone

The following areas comprise the danger zone:
- area of 1 m all around the fixed vehicle
- vicinity of the fixation triangles
- in front of and behind the vehicle
2.2.3 Identification marking

The individual components are marked by an engraving in the following way:

<table>
<thead>
<tr>
<th>Component</th>
<th>Marking</th>
<th>Location of engraving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel hub rod (RST)</td>
<td>RST05 / number</td>
<td>With fork head</td>
</tr>
<tr>
<td>Diagonal wheel hub rod (DRST)</td>
<td>DRST05 / number</td>
<td>With swivel head</td>
</tr>
<tr>
<td>Sliding anchor 300 mm</td>
<td>SA03 / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Sliding anchor 400 mm</td>
<td>SA03L / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Sliding anchor, height adjustable 300-400 mm</td>
<td>SA05H / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Sliding anchor, height adjustable 320-470 mm</td>
<td>SA05HM / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Slide/plug-in bracket</td>
<td>SSK03 / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Short plug-in anchor</td>
<td>STA03K / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Plug-in anchor 300 mm</td>
<td>STA03 / number</td>
<td>On base plate</td>
</tr>
<tr>
<td>Plug-in anchor 400 mm</td>
<td>STA03L / number</td>
<td>On base plate</td>
</tr>
</tbody>
</table>

2.3 Configuration

2.3.1 Scope of Delivery

Per rotating axle the following components are included within the scope of delivery:

- 2 wheel hub rods (RST)
- 2 diagonal wheel hub rods (DRST)
- 4 plug-in anchors
  or 4 sliding anchors (without T-bolts)
- 2 wheel adaptor sets with thread adaptors designed per agreement (more designs on request),
- 2 fixation bearings
- 1 adjusting tool for adjusting the clamping force of the anchors
Important

The whole system is delivered with rods 2.5 meters in length. You can shorten the rods individually to the required length. The free end of the rod must still project at least 10 cm out of the rod holder (KR03) in all applications.

2.3.2 Accessories

In addition, the following components can be delivered as accessories:

![Figure 02: Accessory plug-in anchor cart.
Contains bushings for four plug-in anchors. Suitable for transportation and storage.
The anchors are not included in the scope of delivery.]

![Figure 03: Accessory sliding anchor cart.
Contains devices to carry four sliding anchors. Suitable for transportation and storage.
The anchors are not included in the scope of delivery.]
Figure 04: Accessory rod holder
Fixation rods insert safely and ready-to-use in holders, e.g. directly within the testing room beside the test stand. Number of holders as needed. The rods are not included in the scope of delivery.

Figure 05: Accessory original floor bushings with cover. Permanently fastened to the test stand floor. Anchors are not included in the scope of delivery.

Figure 06: Accessory slide rails. Mounted in or on the test stand floor. The anchors are not included in the scope of delivery.
3. Safety Instructions

**Danger of life through inadequate fixation of the vehicle!**

Vehicle could break away, killing or injuring persons and causing material damage if the wheel hub fixation is mounted incorrectly or inadequately.

- Fix at least one axle with a wheel hub fixation!
- Secure the second axle (e.g. on single rollers) against lateral movement (e.g. by wheel hub fixation, belt fixation, hook fixation with QST).
- Secure vehicle with handbrake during mounting/demounting.
- Always mount wheel hub fixation completely and correctly.
- Fixing configurations differing from these general instructions are possible and in some cases even reasonable (e.g. with only one force transmitting axle on all-wheel dynamometers) but must always be agreed with the manufacturer or are implemented at own risk!

**Danger of life through inadequate protective measures on rotating parts!**

Hands, arms or feet get crushed or severed if they come into contact with rotating parts (wheels, roller).

- Always install coverings and/or ensure safety of personnel through other constructive arrangements (e.g. hoods).
- The operator must assess the risk of remaining in the test area during operation by conducting a risk analysis.

**Danger of life through component parts flying off!**

Component parts can fly off, injure people and cause material damage if bolted connections untighten themselves during test operation.

- Always tighten all bolted connections with the required tightening torque!
- In the case of endurance tests check all bolted connections at least every 12 hours and retighten them if necessary. Differing procedures must always be agreed with the manufacturer beforehand or are implemented at own risk!

**Danger of life and material damage through overstraining!**

Vehicle breaks free, kills or injures people and causes material damage if a component of the wheel hub fixation is unable to withstand the stress and fails.

Always ensure that the wheel hub fixation is used exclusively within permissible values.
**Danger of life through incompletely mounted wheel hub fixation!**
Vehicle breaks free, kills or injures people and causes material damage if the wheel hub fixation is not mounted completely.
Always mount the wheel hub fixation completely.

**Danger of life and material damage through defective or incorrect components of the wheel hub fixation!**
Vehicle breaks free, kills or injures people and causes material damage if components of wheel hub fixation are defective or incorrect.

- Make sure that the configuration of the wheel hub fixation is matched to the vehicle to be tested.
- Only use thread adaptors and wheel adaptors that are compatible with the vehicle wheels.
- Check latch clamp: Must have a closing torque of at least 25 Nm.
- Check rubber coating of rod collet (KR03): Must be firmly seated and have no damage (cracks, notches).
- Check fixation rods and anchors: Must not be deformed or damaged, must be free of dirt and grease.
- Before every test run check all screws that are marked with screw-marking lacquer.
- Carry out maintenance of all components in accordance with chapter “Maintenance and Cleaning” before every test run.

**Injuries through inadequate personal protective equipment!**
Hands and feet can get crushed by heavy components of wheel hub fixation or at anchor joints.

- Always wear personal protective equipment (gloves, safety shoes)!

**Material damage through untrained personnel!**
Wheel Hub fixation, car body, test stand or equipment within the testing room can be damaged if untrained personnel cause an accident.

- Selecting, mounting, demounting, maintenance and cleaning, transportation and storage of the wheel hub fixation requires expert knowledge and must be performed only by trained personnel.
Crest roller dynamometers: Position the vehicle exactly on the peak of the crest rollers and align it to the driving direction before mounting the wheel hub fixation. See chapter 5.3

Only use connecting elements (screws, nuts, latch clamps, locking levers etc.) that are approved by the manufacturer.
4. Construction and function

4.1 Basics

With the wheel hub fixation the vehicle is fastened to the roller or flat-roadway dynamometer, quickly and safely and with no tension.

To fix the vehicle, two fixation rods are attached to each rotating wheel via the wheel adaptor and the fixation bearing. These rods are held by clamping them into the rubberised rod collets (KR03) at the plug-in anchors or the sliding anchors.

The fixation bearing together with the two fixation rods (wheel hub rod, diagonal wheel hub rod) form the fixation triangle.
4.2 Fixation rods

4.2.1 Wheel hub rod

Figure 08: Wheel hub rod

[1] fixation screw and spring washer for fixation bearing
[2] fork head
[3] wheel hub rod
[4] docking unit for diagonal wheel hub rod
[5] drill-hole for securing pin

The fixation bearing, which is placed into the fork head, is attached with the fixation screws.

Important

The tightening torque of the fixation screws is 170 Nm.
4.2.2 Diagonal wheel hub rod

Figure 09: Diagonal wheel hub rod

[1] swivel head
[2] push-fit coupling
[3] drill-hole for securing pin
[4] diagonal wheel hub rod

4.3 Anchor for fixing the rods

There are two different types of anchors for the wheel hub fixation: The plug-in anchor for floor bushings and the sliding anchor for slide rails.

The height of the anchor for a normal axle height is 300 mm. They may be used for a wheel diameter of 430 mm up to 770 mm. In the case of larger wheel diameters, correspondingly higher anchors with 400 mm height must be used. Both plug-in and sliding anchors are available with 400 mm height.

Put the securing pins into the drill-holes of the rods, directly in front of and behind the rod collet (KR03) to avoid the rod from sliding.
4.3.1 Plug-in anchor

Height = distance between middle of rod collet (KR03) and floor of testing room

Important

Use the plug-in anchor with 300 mm height if the wheel diameter is between 430 and 770 mm.

Use the long sliding anchor with 400 mm height if the wheel diameter is between 630 mm and 970 mm. This plug-in anchor has a longer or higher main body.

Figure 10: Plug-in anchor

[1] rubberised rod collet (KR03)
[2] handle
[3] latch clamp
[4] latch clamp handle
[5] securing pin
[6] main body of plug-in anchor
[7] clamping sleeve (operated by locking lever)
[8] locking lever
4.3.2 Sliding anchor

The sliding anchor is screwed tightly into the floor slide rails with T-bolts.

The tightening torque for the T-bolts:
- M16 → 120 Nm
- M20 → 120 Nm

The height is 300 mm or 400 mm.
Height = distance between middle of rod collet (KR03) and floor of testing room

Important

Use the sliding anchor with 300 mm height if the wheel diameter is between 430 mm and 770 mm.
Use the long sliding anchor with 400 mm height if the wheel diameter is between 630 mm and 970 mm. This plug-in anchor has a longer or higher main body.
Figure 11: Sliding anchor

[1] rubberised rod collet (KR03)
[2] handle
[3] latch clamp
[4] latch clamp handle
[5] securing pin
[6] base plate of sliding anchor
[7] t-bolt for fixing into the slide rails (not included in the scope of delivery)
[8] nut for T-bolt (not included in the scope of delivery)

4.3.3 Height adjustable sliding anchor

The height-adjustable sliding anchor is screwed tightly into the test stand floor slide rails with T-bolts.

**Important**

**The tightening torque for the T-bolts:**
- M16 → 120 Nm
- M20 → 120 Nm

It has a variable height from 300 mm to 400 mm (SA05H), from 320 mm to 470 mm (SA05HM) or from 400 mm to 500 mm (SA05HL).

Height = distance between middle of rod collet (KR03) and floor of testing room
The height adjustable sliding anchor can be adjusted in height (5 mm elevation difference per rotation) by turning the rod collet (KR03).

Figure 12: Height adjustable sliding anchor

- [1] rubberised rod collet (KR03)
- [2] handle
- [3] latch clamp
- [4] latch clamp handle
- [5] securing pin
- [6] base plate of sliding anchor
- [7] t-bolt for fixing on slide rails (not included in the scope of delivery)
- [8] nut for T-bolt (not included in the scope of delivery)
- [9] special open-ended spanner for stop nut M48 (1 piece per testing room)
- [10] thread in upper position (height 400 mm)
4.3.4 Sliding anchor with quick clamps

General notice
The sliding anchor with quick clamps can be ordered with fixed height or height adjustable.

Figure 13: Quick clamp with slide block

1. Put the sliding anchor into the slide rail.
2. Turn the sliding block at each quick clamp in the slide rail by 90°. The sliding block is in the correct position when it can no longer be lifted out of the slide rail.
3. Position the levers of all 4 quick clamps at right angles to the slide rail.
4. Screw the stop nut on each of the 4 quick clamps down with a torque of 20 Nm.

The tightening torque for the stop nut is 20 Nm.

Danger to life and damage to property in the case of improper tightening of the stop nut!

If the stop nuts have not been properly tightened with the right torque at the first installation the car can break free from the fixation. It is possible that personnel could be killed or injured and property could be damaged.
**Release of the sliding anchor**

Position the levers of all 4 quick clamps such that they are parallel to the slide rail. See figure.

Then push the sliding anchor in the slide rail to the new position or lift it out of the slide rail.

![Figure 14: Sliding anchor in released position](image)

**Fastening the sliding anchor**

Turn all 4 quick clamp levers by 90° so that they are at right angles to the slide rail.

---

**Danger to life and damage to property in the case of improper tightening of the quick clamp!**

If the quick clamps have not been closed to the stipulated end position at 90° to the slide rails, the car can break free from the fixation. It is possible that personnel could be killed or injured and property could be damaged.
4.3.5 **Slide/plug-in bracket**

The slide/plug-in bracket contains a bushing for plug-in anchors. Thus a plug-in anchor together with a slide/plug-in bracket can be converted to a sliding anchor.

The slide/plug-in bracket is screwed into the slide rails on the floor of the test stand with T-bolts.

**Height** = distance between middle of rod collet (KR03) and floor of testing room

---

**Important**

A short plug-in anchor (STA03K) together with the slide/plug-in bracket becomes a sliding anchor with 300 mm height.

The plug-in anchor with 300 mm height (STA03) *must not* be inserted into the slide/plug-in bracket!

---

**Figure 15: Slide/plug-in bracket**

1. base plate of the slide/plug-in bracket
2. t-bolt for fixing on slide rails (not included in the scope of delivery)
3. bushing for short plug-in anchor (STA03K)
4. nut for T-bolt (not included in the scope of delivery)
4.3.6 Plug-in anchor, short

The short plug-in anchor together with a slide/plug-in bracket becomes a sliding anchor with 300 mm height. Height= distance between middle of rod collet (KR03) and floor of testing room.

**Important**
The short plug-in anchor can only be used together with a slide/plug-in bracket. You cannot plug it into floor bushings.

Figure 16: Plug-in anchor, short

[1] rubberised rod collet (KR03)
[2] handle
[3] latch clamp
[4] latch clamp handle
[5] securing pin
[6] shaft of short plug-in anchor for bushing at the slide/plug-in bracket
4.4 Fixation bearing

Figure 17: Fixation bearing

[1] seating of adaptor cone
[2] fixation bearing
    Rear view (left)
    Front view (right)
[3] seating of external wheel bolt RS05
[4] seating of fastening screw

The fixation bearing is attached to the fork head of the wheel hub rod with two fixation screws. Then it is plugged onto the adaptor cone of the wheel adaptor and tightened with the external wheel bolt.
4.5 **Wheel adaptor**

Figure 18: Mounted wheel adaptor (dismantleable)

[1] wheel  
[2] thread adaptor  
[3] washer  
[4] connecting screw  
[5] inner wheel bolt RS05 and conical spring washer (not visible here)  
[6] wheel adaptor  
[7] adaptor cone  
[8] external wheel bolt RS05 (not visible here)

Wheel adaptor [6], inner wheel bolt RS05 and conical spring washer [5] as well as adaptor cone [7] form a pre-assembled unit and are usually not separated.

4.5.1 **Wheel adaptor**

Wheel adaptors can be manufactured in different designs depending on the wheels of the testing vehicle.

The following parameters can be selected:
- diameter of hole circle (e.g. 100 mm, 112 mm, 120 mm, 145 mm)
- distribution (e.g. 3-hole, 4-hole, 5-hole, 6-hole)

Further wheel adaptors can be manufactured and supplied on request.
4.5.2 **Thread adaptor**

The thread adaptors guarantee the correct and secure seating of the wheel hub fixation on the wheel. Thread adaptors can be manufactured in different designs depending on the wheels of the testing vehicle.

The following parameters can be selected:
- shaft length
- thread diameter
- thread length
- head shape (spherical shoulder and radius or conical shoulder and angle)
- internal or external thread

---

**Important**

There are thread adaptors which are adapted to suit different vehicle and wheel types in each case. These are distinguished by shaft length, thread diameter, thread length, head shape (spherical shoulder and radius or conical shoulder and angle) and internal or external thread.

The standard length of the thread adaptor without the threaded part is 90 mm.

Additional lengths and versions of thread adaptors are provided on request to suit the wheel form of the respective test vehicle.

---

**Figure 19: Examples of thread adaptors**

[1] external thread  
head shape, spherical shoulder and radius  
e.g. R12, R13, R14

[2] internal thread  
head shape, spherical shoulder and radius  
e.g. R12, R13, R14

[3] external thread  
head shape, spherical shoulder and radius  
e.g. R12, R13, R14  
Special length

[4] external thread  
Head shape, conical shoulder 60°  
Special length
5. Mounting the wheel hub fixation
The wheel hub fixation is mounted on all wheels that are driven by the vehicle or by the test stand.

<table>
<thead>
<tr>
<th>Danger of life and material damage through defective or incorrect components of the wheel hub fixation!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle breaks free, kills or injures people and causes material damage if components of wheel hub fixation are defective or incorrect.</td>
</tr>
<tr>
<td>➔ Make sure that the configuration of the wheel hub fixation matches the vehicle to be tested.</td>
</tr>
<tr>
<td>➔ Only use thread adaptors and wheel adaptors that are compatible with the vehicle wheels.</td>
</tr>
<tr>
<td>➔ Check latch clamp: Must have a closing torque of at least 25 Nm!</td>
</tr>
<tr>
<td>➔ Check rubber coating of rod collet (KR03): Must be firmly seated and have no damage (cracks, notches).</td>
</tr>
<tr>
<td>➔ Check fixation rods and anchors: Must not be deformed or damaged, must be dry and free of dirt and grease.</td>
</tr>
<tr>
<td>➔ Before every test run check all screws that are marked with screw-marking lacquer.</td>
</tr>
<tr>
<td>➔ Carry out maintenance of components in accordance with chapter 7: Maintenance and Cleaning” before every test run.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk of injury due to unsecured vehicle during mounting!</th>
</tr>
</thead>
<tbody>
<tr>
<td>With crest roller dynamometers the vehicle could roll off the peak, injuring people and causing material damage if it is not secured during mounting to prevent it slipping or rolling away.</td>
</tr>
<tr>
<td>➔ Before mounting, secure vehicle to prevent it slipping or rolling away (handbrake, centring device).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injuries due to falling components!</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vehicle wheel detaches completely from its attachment and the vehicle tilts, injuring people and causing material damage if all original wheel bolts are removed at once.</td>
</tr>
<tr>
<td>➔ Replace the original wheel bolts individually with the thread adaptors!</td>
</tr>
<tr>
<td>➔ Never remove all wheel bolts at once!</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material damage through incorrect thread adaptors!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect thread adaptors (shaft length, thread diameter, thread length, head shape) may break. This can cause secondary damage at the wheel hub fixation and at the vehicle.</td>
</tr>
<tr>
<td>Check present wheel adaptor set for correct seating. If not seated properly, replace wheel adaptor set or component parts.</td>
</tr>
</tbody>
</table>
The wheel hub fixation fixes the wheels in their preset positions during the test operation. Exceptions to this are the axle height and the tracking. The dynamic characteristic behaviour of the running gear is influenced by this and unusual structural vibrations can result, as well as increased tyre abrasion during the test operation. Therefore align the vehicle as precisely as possible on the test stand before attaching the wheel hub fixation.

5.1  Mounting the wheel adaptor

5.1.1  Assembling the wheel adaptor (dismantleable)

![Diagram of wheel adaptor assembly]

Figure 20: Wheel adaptor (dismantleable)

1. Insert adaptor cone into protruding shoulder of the wheel adaptor as far as the stop and do not tilt.
2. Insert conical spring washer into recess of the wheel adaptor so that it seats planar.
3. Connect conical spring washer with the adaptor cone by means of the inner wheel bolt RS05.

The hole circle of the wheel adaptor must correspond with the hole circle of the wheel (hole number, hole circle diameter). Ensure correct seating.
Important

The tightening torque for the wheel bolts is 120 Nm

Assemble one wheel adaptor set in this manner for every wheel that has to be fixed.
The wheel adaptor [2], inner wheel bolt RS05 [5], conical spring washer [6] and adaptor cone [7] form a pre-assembled unit and are usually not taken apart again after initial assembly. On request, they are also available as a complete component part (non-dismantleable wheel adaptor set).

5.1.2 Non-dismantleable wheel adaptor

![Diagram of non-dismantleable wheel adaptor]

Figure 21: Non-dismantleable wheel adaptor

[1] thread adaptor  
[2] washer  
[3] connecting screw  
[4] non-dismantleable wheel adaptor with adaptor cone  
[5] external wheel bolt RS05

In the case of the non-dismantleable wheel adaptor, the
- wheel adaptor,
- inner wheel bolt,
- conical spring washer and
- adaptor cone

are produced as one component part and cannot be taken apart.

Important

Ensure that each wheel bolt is replaced sequentially with a thread adaptor and tightened with the original tightening torque for the vehicle!
5.1.3 **Fit wheel adaptor to the wheel**

<table>
<thead>
<tr>
<th>Danger</th>
<th>Danger to life due to loose screws during endurance tests!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>People may be injured and material damage may occur if bolted connections at the wheel hub fixation loosen themselves during endurance tests. This is caused by increased loads that differ from normal driving loads and stresses. Safe and correct function of the test operation is impaired by this.</td>
</tr>
<tr>
<td></td>
<td>➔ In the case of endurance tests check firm seating of all bolted connections at least every 12 hours: thread adaptors, connecting screws and both wheel bolts RS05.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Caution</th>
<th>Material damage through wider vehicle!</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mounted wheel adaptor sets with adaptor cones project from the wheels. The vehicle is wider as a result.</td>
</tr>
<tr>
<td></td>
<td>➔ Move vehicle with mounted wheel adaptor sets with great caution and care.</td>
</tr>
</tbody>
</table>

The wheel must meet the technical standards regarding alignment and concentricity. The wheel adaptor set is mounted on every wheel to be fixed, using the following steps:

1. On the first wheel (arbitrarily selected), remove one wheel bolt and replace it with an appropriate thread adaptor.

<table>
<thead>
<tr>
<th>Important</th>
<th>The thread adaptor must correspond to the screw thread and the head shape (spherical shoulder and radius or conical shoulder and angle) of the wheel bolt removed!</th>
</tr>
</thead>
</table>

2. Tighten thread adaptors with correct tightening torque (as original wheel bolt or dependent on the thread dimension)

3. Replace all of the other wheel bolts on the first wheel, step by step.

4. Insert connecting screws [3] with washers [2] through the wheel adaptor into thread adaptors [1], (see fig. 22) and tighten with 120 Nm.

Repeat these mounting steps on all wheels to be fixed.
5.1.4 Replacing the wheel adaptor

Usually the component parts [2, 5, 6 and 7, fig. 21] of the dismantle able wheel adaptor set are firmly bolted together. If testing similar motor vehicle types, the same wheels with the same hole circle dimensions are present. A change of the wheel adaptor is not necessary in this case.

For vehicles with different wheels, the wheel adaptor [see fig. 21+22] must be replaced.

### Important

Further versions of thread adaptors and wheel adaptors matching the wheel form of the respective test vehicle on request.

To replace the dismantle able and non dismantle able wheel adaptor with a wheel adaptor with a different hole circle, the following steps are necessary (see fig. 21+22):

1. Remove all connecting screws [4] and washers [3]. The wheel adaptor set is thereby removed from the wheel.

2. Only dismantle able wheel adaptor: Loosen inner wheel bolt RS05 [5].


4. Only dismantle able wheel adaptor: The adaptor cone can be very firmly seated on the wheel adaptor due to its interference fit (aid: soft-head hammer).

5. Select other wheel adaptor with required dimensions.

6. Only dismantle able wheel adaptor: Assemble wheel adaptor set again, as described in chapter 5.1.1.
5.2 Connecting the fixation bearing with the wheel hub rod

Figure 22: Fixation bearing and wheel hub rod

1. If wheel hub rod is already connected with fixation bearing: check for secure seating of the fixation screws (170 Nm).

2. Move fixation bearing into position per fig. 23.

3. Screw one fixation screw and one spring washer each into both screw threads in fork head ends and tighten with 170 Nm.

Danger of crushing!

Fingers can be crushed because after connection has been established, the fixation bearing is free to rotate in the fork head.

⇒ Do not reach into the fork head, in order to avoid danger of crushing.

5.3 Vehicle on test stand

If the vehicle is to be driven onto the test stand, the following points should be addressed.

Material damage through wider vehicle!

Mounted wheel adaptor sets with adaptor cones project from the wheels. The vehicle is wider as a result.

⇒ Move vehicle with mounted wheel adaptor sets with great caution and care.
Important

Before mounting the wheel hub fixation, position the vehicle on the test stand and align it (e.g. with centring device and jogging mode).

In doing so, observe the applicable processing and safety regulations.

Engage the parking brake to secure the test vehicle against rolling away during mounting of the wheel hub fixation.

5.4 Fixing the first wheel

Figure 23: Installation schematic with sliding anchors and plug-in anchors

1. angle small or as parallel as possible to the longitudinal vehicle axis
2. angle min. 30°, max. 45°
3. slide rail
4. sliding anchor on slide rail
5. driving wind blower
6. plug-in anchor in floor receptacle
7. additional floor bushing
8. test vehicle on test stand
9. diagonal wheel hub rod
10. wheel hub rod

Important

Using plug-in anchors: Original floor bushings must be installed.
Using sliding anchors: Slide rails must be installed.
Delivery and mounting on request.
Figure 24: Finished, assembled wheel hub fixation, plan view

1. wheel hub rod with fork head
2. diagonal wheel hub rod with push-fit coupling
3. external wheel bolt RS05
4. fixation screw
5. fixation bearing
6. wheel with tyre
7. wheel adaptor
8. thread adaptor

Figure 25: Finished, assembled wheel hub fixation, side view

+5° - 5°
5.4.1 Positioning the first anchor (for wheel hub rod)

Danger of crushing at pivoted joint and at rod collet (KR03)!

Fingers could be crushed.

➔ At anchors never reach into pivoted joint or into joint of the rod collet (KR03)!

Figure 26: Position for first anchor and wheel hub rod

[1] wheel hub rod with fixation bearing
[2] angle small or as parallel as possible to longitudinal vehicle axis
[3] position for first sliding anchor
[4] position for first plug-in anchor

Important Conditions for position of first anchor (circle in fig. 27):

- Wheel hub rod runs as parallel as possible to longitudinal vehicle axis.
- Distance between anchor and wheel: between 1m and 2 m.

On both sides and directly beside rod collet (KR03) a securing pin must fit into drill-hole of wheel hub rod.

Important Condition for appropriate anchor height:

- Maximum allowed inclination of fixation rod: 5° or 9% (9 cm height difference with 1 m distance between anchor and vehicle).
- Anchor with 300 mm height: Wheel diameter must be between 430 mm and 770 mm.
- Anchor with 400 mm height: Wheel diameter must be between 630 mm and 970 mm.

For the exactly horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05H).
1. Slide first sliding anchor into appropriate position on slide rails or plug first plug-in anchor into appropriate floor bushing.

2. Open rod collet (KR03).

5.4.2 Connecting the wheel hub rod and the fixation bearing with the adaptor cone

**Danger of crushing at fixation bearing and at fork head!**
Fingers could be crushed because the fixation bearing is free to rotate in the fork head!

→ Do not reach into the fork head.

**Danger of injury through fixation bearing slipping off!**
Feet could be injured through untightened fixation bearing slipping off.

→ Hold the fixation bearing securely until wheel bolt RS05 is inserted. Otherwise the fixation bearing (heavy!) can slip off the adaptor cone.

![Diagram](image.png)

Figure 27: Connect adaptor cone and fixation bearing

1. Slide fixation bearing with pre-assembled wheel hub rod onto adaptor cone. Free end of wheel hub rod may rest on the floor.

2. Connect fixation bearing with adaptor cone using the external wheel bolt RS05 and tighten with 120 Nm.

**Important**
First eliminate moisture and dirt (dust, oil, grease) at rubber coating or at fixation rod using soft cloth and a degreasing agent (all-purpose cleaner) if necessary!

3. Place wheel hub rod into opened rod collet (KR03).

5.4.3 **Positioning the second anchor (for diagonal wheel hub rod)**

**Danger**
Danger of crushing at pivoted joint and at rod collet (KR03)!

Fingers could be crushed.

→ At anchors never reach into pivoted joint or into joint of the rod collet (KR03)!

Figure 28: Position for second anchor and diagonal wheel hub rod

<p>| | | | |</p>
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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>[1]</td>
<td>position of second Sliding anchor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[2]</td>
<td>diagonal wheel hub rod with push-fit coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[3]</td>
<td>angle min. 30°, max. 45°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[4]</td>
<td>position of second Plug-in anchor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Conditions for position of second anchor (circle in fig. 27):
- Angle between wheel hub rod and diagonal wheel hub rod 30° to 45°.
- Distance between anchor and wheel: between 1m and 2 m.
- On both sides and directly beside rod collet (KR03) a securing pin must fit into drill-hole of wheel hub rod.

### Important
**Condition for appropriate anchor height:**
- Maximum allowed inclination of fixation rod: 5° or 9% (9 cm height difference with 1 m distance between anchor and vehicle).
- Anchor with 300 mm height: Wheel diameter must be between 430 mm and 770 mm.
- Anchor with 400 mm height: Wheel diameter must be between 630 mm and 970 mm.
- For the exactly horizontal alignment of the fixation rod, use the height adjustable sliding anchor (SA05H).

1. Slide second sliding anchor into appropriate position on slide rails or plug second plug-in anchor into appropriate floor bushing.
2. Open rod collet (KR03).

### 5.4.4 Connecting the diagonal wheel hub rod with the wheel hub rod

First eliminate moisture and dirt (dust, oil, grease) at rubber coating or at fixation rod using soft cloth and a degreasing agent (all-purpose cleaner) if necessary!

1. Place diagonal wheel hub rod into opened rod collet (KR03).
2. Pull diagonal wheel hub rod at swivel head in direction of fixation bearing.
3. Insert swivel head into docking unit at wheel hub rod.
4. Insert push-fit coupling through docking unit and swivel head to connect both of the rods with each other.
5.4.5 Clamping both anchors

1. At both anchors: Close rod collet (KR03) and lock both latch clamps. The closing torque must be at least 25 Nm (see fig. 32).

2. At both anchors: On both sides insert a securing pin through drill-hole in the fixation rod directly beside rod collet (KR03). Securing pins must be as close as possible to rod collet (KR03).

3. At both anchors (plug-in anchors): Close locking lever to fix anchor in floor bushing by clamping.

   At both anchors (sliding anchor): Tighten all nuts of T-bolts at base plate of the sliding anchor, per manufacturer’s instructions, to fix anchor on slide rails.

   Height-adjustable sliding anchor (SA05H): Tighten stop nut normally using special open-ended spanner provided. Do not use any additional tools.

The first wheel is now fixed completely. The vehicle must now be rolled in and only after that are the remaining wheels fixed. Exception: The vehicle has already been aligned with the help of a centring device, for example.
5.5 Rolling in the vehicle

1. Release hand brake or remove centring device.

2. Roll in vehicle.

3. Pull hand brake on again or activate centring device again so that vehicle is secured.

4. Open latch clamps on both anchors and close them again. This allows any tension that may have arisen when rolling in to be released.

Caution

When running the vehicle onto the roller care should also be taken to ensure that the vehicle does not tend to run to one side or the other after the running-on process is complete. The kinematics of the wheel hub restraints cause slight steering movements on the vehicle. This prevents undesired tensioning of the vehicle steering during the course of the test but requires an explicit fastening of the steering on the part of the operator.

5.6 Fixing the remaining wheels

Fix the remaining wheels in the same way.

Important

After mounting all fixation triangles, the vehicle is fixed in position and cannot be moved or adjusted any more.

Before every subsequent movement of the vehicle (e.g. raising or lowering of the roller) the latch clamps of all anchors must be loosened. Otherwise there is a danger of bending the rods! After this movement of the vehicle, the latch clamps of all anchors must be locked again.

Always secure test vehicle against rolling away during mounting of the wheel hub fixation by engaging the parking brake.
5.7 Running the driving cycle

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Material damage at wheel hub fixation and at vehicle!</strong></td>
</tr>
<tr>
<td>Screw connections can become unscrewed if they are not tightened correctly.</td>
</tr>
<tr>
<td>➞ After completely setting up the wheel hub fixation, test-run the vehicle.</td>
</tr>
<tr>
<td>➞ Then check all screw connections (e.g. thread adaptors, connecting screws, fixation screws) for tight fit and correct tightening torque.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>When operating the vehicle with wheel hub restraints it is necessary to ensure that a driver constantly monitors the steering wheel and stabilises it as necessary just as with normal road driving or that it is permanently fastened in place in the case of operating with a driving robot. The steering dynamics of the vehicle generally ensure that a vehicle runs in a straight line autonomously but in the event of disturbances (flat tyres, etc.) careful stabilisation and checking of the steering system must be assured.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Caution</th>
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<tbody>
<tr>
<td>If there are unusually high levels of vibrations on the test vehicle during operation after the wheel hub restraints are fitted, it is recommended to measure the concentricity of the wheel rim adaptors installed. As a result of manufacturing inaccuracies or wear and tear in the vehicle wheels used, misalignment may arise when the wheel hub restraints are fitted, resulting in a pendulum motion of the wheel rim adaptors and this in turn can lead to undesired high vehicle excitations and thus vibrations. The manufacturing tolerances of the wheel hub restraint components are around 1/100mm. The concentricity of the wheel hub unit is ca. 0.1mm. The concentricity error of the assembly installed on the vehicle wheel should not be more than 0.2 mm (measured at the wheel rim adaptor in horizontal direction) to allow a smooth test run. With measured values &gt; 0.2mm it may be necessary to have the vehicle wheels reworked.</td>
</tr>
</tbody>
</table>
6. Demounting the wheel hub fixation

Warning
Risk of injury through unsecured vehicle during demounting!
With crest roller dynamometers the vehicle could roll off the peak, injuring people and causing material damage if it is not secured during demounting.

→ Before demounting, secure vehicle to prevent it slipping or rolling away (handbrake, centring device).

Demounting of wheel hub fixation in reverse order of mounting.

6.1 Open both anchors

Danger
Danger of crushing at rod collet (KR03) after test run!
Fingers could be crushed during opening of latch clamp if rod is under mechanical tension after test run and jumps off.

→ Use appropriate personal protective equipment (gloves).
→ Open latch clamp carefully.
→ Hold rod tight so it cannot jump off.

1. At both anchors: Remove securing pin from the fixing rod.

2. Height-adjustable sliding anchor (SA05H): Loosen stop nuts with the special open-ended spanner provided.
   At both anchors (plug-in anchors): Open locking lever to release anchor from the floor bushing.
   At both anchors (sliding anchor): Untighten all nuts of T-bolts at base plate of sliding anchor to loosen anchor on slide rails.

Danger
Danger of crushing at rod collet (KR03)!
Fingers could be crushed.

→ At anchors never reach into joint of the rod collet (KR03)!

3. At both anchors: Open latch clamps at anchor and open rod collet (KR03).
6.2 Demounting the diagonal wheel hub rod

1. Withdraw push-fit coupling from docking unit.
2. Remove diagonal wheel hub rod and store it in accordance with instructions.
3. Close rod collet (KR03) again so that rubber coating is not damaged during transportation or storage.
4. Remove anchor and store it in accordance with instructions.

6.3 Demounting the wheel hub rod

1. Remove wheel hub rod from rod collet (KR03) and set the end of rod down on the floor.
2. Close rod collet (KR03) again so that rubber coating is not damaged during transportation or storage.
3. Remove anchor and store it in accordance with instructions.

6.4 Demounting the fixation bearing

Danger of injury through fixation bearing slipping off!

Feet could be injured through loosened fixation bearing slipping off.

⇒ Hold the fixation bearing securely as soon as wheel bolt RS05 is removed. Otherwise the fixation bearing can slip from the adaptor cone.
⇒ The fixation bearing is heavy and can seat tightly.

Danger of crushing at fixation bearing and at fork head!

Fingers could be crushed because the fixation bearing is free to rotate in the fork head!

⇒ Do not reach into the fork head.

1. Unscrew external wheel bolt RS05 at fixation bearing.
2. Pull off fixation bearing together with wheel hub rod from adaptor cone of wheel adaptor set and store in accordance with instructions.

Demount the remaining fixation triangles in the same way.
6.5 Demounting the wheel adaptor

<table>
<thead>
<tr>
<th>Material damage through wider vehicle!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounted wheel adaptor with adaptor cones project from the wheels. The vehicle is wider as a result and can cause damage to property when driving past.</td>
</tr>
<tr>
<td>➞ Move vehicle with mounted wheel adaptor sets with great caution and care.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk of adaptor cone corrosion!</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the wheel adaptor sets are not demounted immediately after the test operation, the adaptor cones can corrode.</td>
</tr>
<tr>
<td>➞ It is imperative that the adaptor cones be protected from humidity!</td>
</tr>
</tbody>
</table>

1. Remove all connecting screws and spring washers at first wheel (arbitrarily selectable).

2. Remove wheel adaptor including adaptor cone - consider its weight whilst doing so!

<table>
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<tr>
<th>Injuries due to falling components!</th>
</tr>
</thead>
<tbody>
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<td>The vehicle wheel detaches completely from its attachment and the vehicle tilts, injuring people and causing material damage if all thread adaptors are removed at once.</td>
</tr>
<tr>
<td>➞ Replace the thread adaptors individually for the original wheel bolts!</td>
</tr>
<tr>
<td>➞ Never remove all thread adaptors at once!</td>
</tr>
</tbody>
</table>

3. Remove a thread adaptor and replace with an original wheel bolt. Tighten original wheel bolt with correct screw torque (as original wheel bolt or in accordance with thread dimensions)

4. Replace all further thread adaptors with original wheel bolts on the first wheel, step by step.

Deal with the remaining wheels in the same way.
7. Maintenance and cleaning

7.1 General maintenance notes

Perform the maintenance tasks described here on all components of the wheel hub fixation periodically, before every mounting.

In this chapter only maintenance and cleaning jobs that can be performed by the operator of the test stand themselves are described. Further maintenance jobs must be carried out by specially trained service personnel or by the manufacturer themselves.

Always keep all components of the wheel hub fixation clean, dry and free of grease for mounting and during storage. Always use fixation rods and rubberised rod collets (KR03) in clean, dry and grease-free condition.

Screws and nuts that are marked with screw-marking lacquer must not be altered or re-tightened by the operator.

If the screw-marking lacquer is damaged return the whole anchor to the manufacturer for checking and re-adjustment.
7.2 Maintenance of anchors

7.2.1 Plug-in anchor

Figure 30: Plug-in anchor maintenance

1. rod holder (KR03)
2. warning sticker “danger of crushing”
3. latch clamp handle
4. fastening screws (4x)
5. joint screw
6. securing pin
7. cylindrical pin on tilt joint
8. clamping sleeve for floor bushing
9. stop nuts for clamping sleeve
10. cylindrical pin and screw
11. fastening screws (4x)
12. locking lever
13. screw for locking lever

Important

The following screw connections are marked with screw-marking lacquer: [4], [5], [9], [10], [11], [13]

Before mounting always check screw-marking lacquer for damage. Do not turn the screws or move the nuts out of position!
7.2.2 Sliding anchor

Figure 31: Sliding anchor maintenance


Important

The following screw connections are marked with screw-marking lacquer: [4], [5].
Before mounting always check screw-marking lacquer for damage. Do not turn the screws or move the nuts out of position!
7.2.3 **Maintenance of individual anchor components**

The majority of the components of the plug-in anchors and sliding anchors should be serviced in the same manner. This is described hereafter (see figs. 33/34/35):

7.2.3.1 **Clamping force of the latch clamps**

The latch clamps of the anchors must have a closing torque of at least 25 Nm to ensure the correct clamping force. This is adjusted via the latch fasteners using nuts and stop nuts.

Required for adjusting the closing torque: Special adjusting tool (contained within the scope of delivery), torque wrench, size 19 socket.

If the operator cannot adjust the clamping force themselves, return the anchor to the manufacturer for maintenance.

1. Set the torque wrench to 25 Nm and fit the size 19 socket.

2. Open latch clamp.

3. Insert adjusting tool.

4. Apply torque wrench and check closing torque.

5. Adjust nuts and stop nuts until the closing torque is at least 25 Nm.

See fig. 33 and 34.

Replace tab washers and stop nuts with new ones if their functionality can no longer be guaranteed (if they are worn out).

Ensure that when adjusting a latch clamp that the other is open. This ensures that each latch clamp transfers the correct clamping force.
Figure 32: Adjusting tool for setting the clamping force.

7.2.3.2 Screw and nut connections with screw-marking lacquer

Figure 33: Screw-marking lacquer at rod collet
Figure 34: Screw-marking lacquer at locking lever
7.2.3.3 Screw-marking lacquer

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if screw-marking lacquer is damaged at one or more nuts or the marking is no longer aligned (also see fig. 33, 34 and 35).</td>
<td>Replace whole anchor.</td>
</tr>
</tbody>
</table>

7.2.3.4 Rod holder

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if rubber coating is damaged.</td>
<td>Replace whole anchor.</td>
</tr>
<tr>
<td>Check if rubber coating is dirty, greasy or moist.</td>
<td>Clean and dry rubber coating. Do not use steam jet cleaning machines or aggressive agents, only water and all-purpose cleaner.</td>
</tr>
<tr>
<td>Check for damage.</td>
<td>Replace whole anchor.</td>
</tr>
<tr>
<td>Check if warning sticker “danger of crushing” is damaged or missing.</td>
<td>Replace warning sticker “danger of crushing”.</td>
</tr>
</tbody>
</table>

7.2.3.5 Securing pins

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if securing pins are missing or damaged.</td>
<td>Replace securing pins.</td>
</tr>
</tbody>
</table>

7.2.3.6 Cylinder pin DIN 7 with securing ring DIN 471 at pivoted joint

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if cylinder pin is missing or incorrectly seated.</td>
<td>Replace whole anchor.</td>
</tr>
</tbody>
</table>

7.2.3.7 Clamping sleeve for floor bushing

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if clamping sleeve is tight despite locking lever being released.</td>
<td>Replace whole anchor.</td>
</tr>
<tr>
<td>Check if screw-marking lacquer on stop nut is damaged.</td>
<td>Replace whole anchor.</td>
</tr>
</tbody>
</table>
### 7.2.3.8 Locking lever

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if locking lever is hard to move or does not snap into locking position.</td>
<td>Replace whole anchor.</td>
</tr>
<tr>
<td>Check if rubberised grip plate is missing or loose.</td>
<td>Replace grip plate.</td>
</tr>
</tbody>
</table>

### 7.2.3.9 T-bolts and nuts for slide rails (not included within scope of delivery)

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if T-bolts incl. nuts are missing or damaged.</td>
<td>Replace T-bolts incl. nuts.</td>
</tr>
</tbody>
</table>

### 7.2.3.10 Height adjustable sliding anchor

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if height adjustment is damaged or no longer adjustable.</td>
<td>Replace whole anchor.</td>
</tr>
</tbody>
</table>
7.3 Maintenance of fixation rods

Figure 35: Maintenance of fixation rods


Important

Detecting deformed fixation rods:
- Put fixation rod on a planar surface, e.g. calibration table / surface plate.
- Roll fixation rod on surface, rod head projects beyond table edge.
- Look out for any differences from longitudinal axis (deformation).
- If biggest deviation from the longitudinal axis is more than 10 mm, then the fixation rod is impermissibly deformed

Do not use deformed fixation rods for safety reasons!
7.3.1 **Diagonal wheel hub rod**

Carry out visual and functional check before every mounting!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if rod is dirty, greasy or moist.</td>
<td>Clean and dry rod. Do not use steam jet cleaning machines or aggressive agents, only water and all-purpose cleaner.</td>
</tr>
<tr>
<td>Check if rod is damaged or deformed by more than 10 mm.</td>
<td>Replace whole rod.</td>
</tr>
<tr>
<td>Check if swivel head is damaged or deformed.</td>
<td>Replace whole rod.</td>
</tr>
<tr>
<td>Check if push-fit coupling is missing or deformed.</td>
<td>Replace push-fit coupling.</td>
</tr>
</tbody>
</table>

7.3.2 **Wheel hub rod**

Carry out visual and functional check before every mounting!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if rod is dirty, greasy or moist.</td>
<td>Clean and dry rod. Do not use steam jet cleaning machines or aggressive agents, only water and all-purpose cleaner.</td>
</tr>
<tr>
<td>Check if rod is damaged or deformed by more than 10 mm.</td>
<td>Replace whole rod.</td>
</tr>
<tr>
<td>Check if docking unit for diagonal wheel hub rod is damaged or deformed.</td>
<td>Replace whole rod.</td>
</tr>
<tr>
<td>Check if fork head is damaged or deformed.</td>
<td>Replace whole rod.</td>
</tr>
<tr>
<td>Check if fixation screws are damaged or loose (if fixation bearing is attached to fork head).</td>
<td>Replace or tighten with 170 Nm.</td>
</tr>
</tbody>
</table>
7.4 Maintenance of wheel adaptor set and fixation bearing

Figure 36: Maintenance of wheel adaptor set and fixation bearing


7.4.1 Bolted connections

Before every mounting check all bolted connections for secure seating!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if screws are damaged or loose.</td>
<td>Tighten or replace them. See chapter 5 ff. for tightening torques.</td>
</tr>
</tbody>
</table>
### 7.4.2 Fixation bearing

**Important**

Maintenance of the fixation bearing after 15,000 hours of operation or 1 million kilometres, and at least every 3 years.

Maintenance is always carried out by the manufacturer.

Never service fixation bearings yourself!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if fixation bearing is dirty or damaged.</td>
<td>Clean externally (wipe off only). Replace complete bearing.</td>
</tr>
<tr>
<td>Check if warning sticker “danger of crushing” is damaged or missing.</td>
<td>Replace warning sticker.</td>
</tr>
</tbody>
</table>

### 7.4.3 Wheel adaptor

Carry out visual and functional check before every mounting!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if wheel adaptor is damaged.</td>
<td>Replace wheel adaptor.</td>
</tr>
</tbody>
</table>

### 7.4.4 Adaptor cone

Carry out visual and functional check before every mounting!

<table>
<thead>
<tr>
<th>Inspection (defect described)</th>
<th>Maintenance job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check if adaptor cone is dirty or greasy.</td>
<td>Clean adaptor cone. Do not use steam jet cleaning machines or aggressive agents, only water and all-purpose cleaner.</td>
</tr>
<tr>
<td>Check if adaptor cone is damaged.</td>
<td>Replace adaptor cone or non-dismantleable wheel adaptor set.</td>
</tr>
</tbody>
</table>
7.5 Cleaning

Always keep the wheel hub fixation clean and dry. This guarantees operational safety and fault-free long-term functional capability of the wheel hub fixation as well as of the test stand.

**Important**

Wipe the wheel hub fixation periodically with a soft, lint-free cleaning cloth. Only use water and all-purpose cleaner. After cleaning, wipe off remaining moisture thoroughly or allow to dry.

*Do not* use steam jet cleaning machines, high-pressure cleaning equipment or chemically aggressive agents to clean the components of the wheel hub fixation!
8. Transportation and storage

**Danger of crushing at pivoted joint and at rod collet (KR03)!!**

Fingers could be crushed.

→ At anchors never reach into pivoted joint or into joint of the rod collet (KR03)!

**Material damage through untrained personnel!!**

Wheel Hub fixation, car body, test stand or equipment within the testing room can be damaged if untrained personnel cause an accident.

→ Selecting, mounting, demounting, maintenance and cleaning, transportation and storage of the wheel hub fixation requires expert knowledge and must be performed only by trained personnel.

→ Transportation only with suitable transport equipment.

**Risk of injury and risk of material damage through falling rods!!**

People can be subjected to head or limb injuries through falling rods. Material damage can occur.

→ Secure rods to prevent them falling if they are stored upright.

**Important**

Avoid impacts and shocks during transportation and storage!

The rubber coating of the rod collet (KR03) in particular must not be damaged! Therefore only transport the anchor with the rod collet (KR03) in closed position.

Store the wheel hub fixation in areas that are protected from the weather, clean and dry! Ensure low fluctuation of temperature because otherwise the components are prone to accelerated aging.

The packaging is only provided for shipping and not for storage!
### 9. Replacement parts and accessories

<table>
<thead>
<tr>
<th>Replacement part / accessory part</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread adaptor, size per discussion</td>
<td>GA05</td>
</tr>
<tr>
<td>Connecting screw and washer</td>
<td>VS05</td>
</tr>
<tr>
<td>Conical spring washer</td>
<td>SS05</td>
</tr>
<tr>
<td>adaptor cone</td>
<td>AK05</td>
</tr>
<tr>
<td>Wheel adaptor, dismantleable (hole circle per customer's wishes)</td>
<td>FA05</td>
</tr>
<tr>
<td>Wheel adaptor, non-dismantleable (hole circle per customer's wishes)</td>
<td>FA05K</td>
</tr>
<tr>
<td>Inner or external wheel bolt</td>
<td>RS05</td>
</tr>
<tr>
<td>Fixation bearing</td>
<td>FL05</td>
</tr>
<tr>
<td>Fixation screw and spring washer</td>
<td>FS05</td>
</tr>
<tr>
<td>Wheel hub rod with fork head (RST)</td>
<td>RST05</td>
</tr>
<tr>
<td>Diagonal wheel hub rod with swivel head (DRST)</td>
<td>DRST05</td>
</tr>
<tr>
<td>Plug-in anchor 300mm</td>
<td>STA03</td>
</tr>
<tr>
<td>Plug-in anchor 400mm</td>
<td>STA03L</td>
</tr>
<tr>
<td>Plug-in anchor, short</td>
<td>STA03K</td>
</tr>
<tr>
<td>Slide/plug-in bracket (without T-bolts)</td>
<td>SSK03</td>
</tr>
<tr>
<td>Sliding anchor 300mm (without T-bolts)</td>
<td>SA03</td>
</tr>
<tr>
<td>Sliding anchor 400mm (without T-bolts)</td>
<td>SA03L</td>
</tr>
<tr>
<td>Sliding anchor 300-400mm (without T-bolts)</td>
<td>SA05H</td>
</tr>
<tr>
<td>Sliding anchor 320-470mm (without T-bolts)</td>
<td>SA05HM</td>
</tr>
<tr>
<td>Plug-in anchor cart for 4 plug-in anchors</td>
<td>STAW03</td>
</tr>
<tr>
<td>Sliding anchor cart for 4 sliding anchors</td>
<td>SAW03</td>
</tr>
<tr>
<td>Floor bushing for plug-in anchor</td>
<td>BB03</td>
</tr>
<tr>
<td>Slide rails for sliding anchor (on request)</td>
<td>MS03</td>
</tr>
<tr>
<td>Rod holder for 4 wheel hub fixation rods</td>
<td>SHR03</td>
</tr>
<tr>
<td>Push-fit coupling Ø16 l=40</td>
<td>SBHF03-65</td>
</tr>
<tr>
<td>Warning sticker “danger of crushing”</td>
<td>SBHF03-02</td>
</tr>
<tr>
<td>Torque wrench for adjusting tool SBHF03-22</td>
<td>SBHF03-06</td>
</tr>
<tr>
<td>Grip plate for locking lever at plug-in anchor</td>
<td>SBHF03-09</td>
</tr>
<tr>
<td>Chain or steel cable with ring for securing pin</td>
<td>SBHF03-11</td>
</tr>
<tr>
<td>Adjusting tool for adjusting the clamping force of the anchor</td>
<td>SBHF03-22</td>
</tr>
<tr>
<td>Grip plate for latch clamp</td>
<td>SBHF03-36</td>
</tr>
<tr>
<td>Black end cap for fixation rods</td>
<td>SBHF03-38</td>
</tr>
<tr>
<td>Securing pin with stainless steel knob for anchor, Ø6 l=50</td>
<td>SBHF03-39</td>
</tr>
<tr>
<td>Replacement part / accessory part</td>
<td>Order number</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>All-purpose cleaner for cleaning the components</td>
<td>SBHF03-48</td>
</tr>
<tr>
<td>Open-ended spanner for SA05H, SA05HM</td>
<td>SBHF03-50</td>
</tr>
<tr>
<td>M16 T-bolt for sliding anchors and slide rails</td>
<td>SBHF03-51</td>
</tr>
<tr>
<td>M20 T-bolt for sliding anchors and slide rails</td>
<td>SBHF03-52</td>
</tr>
<tr>
<td>Operating manual for wheel hub fixation (this manual) Please request latest version.</td>
<td>BA wheel hub fixation</td>
</tr>
<tr>
<td>Set of wall charts for wheel hub fixation (1 set = 3 charts)</td>
<td>Wall charts wheel hub fixation</td>
</tr>
</tbody>
</table>

**Safety warning**

The vehicle fixation devices from S. Bleyer GmbH may only be used as a complete unit for safety reasons.

Mixing with components from other manufacturers is not permitted.
10. Technical Data

10.1 Vehicle and testing parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible vehicle mass</td>
<td>max. 3,500 kg</td>
</tr>
<tr>
<td>Permissible axle load</td>
<td>max. 2,000 kg</td>
</tr>
<tr>
<td>Permissible acceleration / braking deceleration</td>
<td>max. 10.0 m/s²</td>
</tr>
<tr>
<td>Permissible tractive force</td>
<td>max. 30,000 N</td>
</tr>
<tr>
<td>Kick-down</td>
<td>Permitted</td>
</tr>
<tr>
<td>Full brake application</td>
<td>Permitted</td>
</tr>
<tr>
<td>Anchor height</td>
<td>300 mm to 400 mm</td>
</tr>
<tr>
<td>Permissible speed</td>
<td>Max. 300 km/h</td>
</tr>
<tr>
<td>Wheel diameter of vehicle</td>
<td>10 inch to 22 inch</td>
</tr>
</tbody>
</table>
| Distance between vehicle and plug-in anchor or sliding anchor | min. 1.0 m  
|                                                  | max. 2.0 m             |
| Temperature range                                 | -40 °C to +50 °C       |

10.2 Fixation rods

10.2.1 Wheel hub rod

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of rod without fork head</td>
<td>2,000 mm</td>
</tr>
<tr>
<td>Length of fork head</td>
<td>135 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 9.5 kg</td>
</tr>
</tbody>
</table>

10.2.2 Diagonal wheel hub rod

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of rod without swivel head</td>
<td>2,000 mm</td>
</tr>
<tr>
<td>Length of swivel head</td>
<td>70 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 7.5 kg</td>
</tr>
</tbody>
</table>
10.3 Anchors

Height= distance between middle of rod collet (KR03) and floor of testing room

| Length of rod collet (KR03) (same for all anchors) | 400 mm |

10.3.1 Plug-in anchor

<table>
<thead>
<tr>
<th>Plug-in anchor (STA03)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>300 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 15 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Short plug-in anchor (STA03K)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height with slide/plug-in bracket</td>
<td>300 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 12 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long plug-in anchor (STA03L)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>400 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 16 kg</td>
</tr>
</tbody>
</table>

10.3.2 Sliding anchor

<table>
<thead>
<tr>
<th>Dimensions of base plate</th>
<th>250 mm x 380 mm or per customer's wishes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimension between axes of drill holes for slide rails</td>
<td>120 mm or per customer's wishes</td>
</tr>
<tr>
<td>Diameter of drill holes</td>
<td>for M16 T-bolts or per customer's wishes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sliding anchor (SA03)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>300 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 18 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long sliding anchor (SA03L)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>400 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 20 kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height adjustable sliding anchor (SA05H)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>300 - 400 mm</td>
</tr>
<tr>
<td>Height difference per rotation</td>
<td>5 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 27 kg</td>
</tr>
</tbody>
</table>
### 10.3.3 Slide/plug-in bracket

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>220 mm</td>
</tr>
<tr>
<td>Height with STA03K</td>
<td>300 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 8 kg</td>
</tr>
</tbody>
</table>

### 10.4 Wheel adaptor set and fixation bearing

#### 10.4.1 Thread adaptor

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft length, thread diameter, thread length, head shape</td>
<td>matched to wheel form of the respective test vehicle</td>
</tr>
<tr>
<td>Screw quality</td>
<td>8.8</td>
</tr>
<tr>
<td>Screw tightening torque</td>
<td>See chapter 5 ff.</td>
</tr>
</tbody>
</table>

#### 10.4.2 Wheel adaptor

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>External diameter</td>
<td>Matched to wheel size and hole circle of the respective test vehicle</td>
</tr>
<tr>
<td>Number of drill holes for connecting screws</td>
<td>Matched to wheel of the respective test vehicle</td>
</tr>
<tr>
<td>Mass</td>
<td>Approx. 3.5 kg</td>
</tr>
</tbody>
</table>

#### 10.4.3 Fixation bearing

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>Approx. 7.5 kg</td>
</tr>
<tr>
<td>Drill hole for temperature measuring sensor (optional)</td>
<td>Position and diameter of drill hole per required temperature sensor</td>
</tr>
</tbody>
</table>