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## 1. Important information

### 1.1. General

The following maintenance instructions apply to BPW trailer axles and BPW suspensions for drawbar trailers and semi-trailers (manufactured from 1982 onwards). They are part of the Terms and Conditions for the ECO Plus Warranty (see warranty documents at www.bpw.de).

Carry out the latest maintenance instructions in accordance with the prescribed intervals in order to maintain the safe operation and roadworthiness of the vehicle. The latest version of the maintenance instructions can always be found at www.bpw.de. The latest printed version is available by post on request. The relevant operation and service regulations of the vehicle manufacturer and the manufacturers of other vehicle parts must also be adhered to.

These maintenance intervals are set out in calendar weeks and are listed to coincide with statutory testing requirements (ZU, HU, BSU).

### 1.2. Maintenance, Repair and Spare Parts

Rectification of any discovered defects or replacement of worn parts should be carried out by a BPW Service Centre or BPW Direct Service Partner unless the vehicle owner has the appropriate trained personnel, facilities, equipment and workshop manuals available and possesses an official certificate to perform interim inspections or special brake inspections.

We strongly recommend that only genuine BPW parts, brake linings in particular, are used when fitting spare parts. Parts authorised by BPW for trailer axles and axle units are regularly subjected to special inspections. BPW accepts product responsibility for them.

BPW is unable to determine whether all third party products can be used with BPW trailer axles and axle suspensions without any safety risk; this also applies even if an authorised testing organisation has accepted the product.

The ECO Plus Warranty (see warranty documents) will cease to apply if spare parts other than genuine BPW spare parts are used.

### 1.3. Definition On-Road / Off-Road

The term “On-Road” refers to roads having a sealed and metalled surface, in other words with an asphalt or concrete surface. Gravel roads are regarded as being Off-Road. A vehicle is also regarded as being in Off-Road operation even if it departs from sealed surfaces under operating conditions for only short periods. Off-Road operation is assumed in all cases in tippers and vehicles with comparable applications.

### 1.4. Latest Version

The latest maintenance instructions are dated 01.06.2016 and replace maintenance instructions BPW-W 33111501e. All previous maintenance instructions become invalid. We reserve the right to make any changes.
2 Safety instructions

The following instructions should also be adhered to by the driver in addition to the statutory regulations:

In case of a new vehicle:
- After the first run under load conditions and after each wheel change:
  • Check wheel nuts for firm seating using a torque wrench. See point 1 on page 26, 42, 52.
- After the first two weeks (after the first runs under load conditions):
  • Check that the bolt connections of the spring attachments and axle steering devices are secure, depending on the application (On-Road or Off-Road). Observe the stipulated tightening torques.
  • Air suspensions: see 4 to 9 page 78 - 82
  • Leaf-spring suspensions: see 2 and 4 page 89 - 90
  see 1 and 3 page 95

Prior to each run:
- Air reservoir of the brake and air suspension set at operating pressure.
- Visual inspection:
  • Tyre pressure
  • Wheel fixings
  • Check operation of lighting and braking systems
  • Drum brake: Check the brake pad/lining thickness when the brake pad/lining wear indicator is in the horizontal position.
  • Disc brake: Check the remaining brake pad / lining thickness.
    Type TSB: The thickness of the remaining pad can be determined by the position of the caliper in relation to the brake carrier (see page 43).
    Type SB: The thickness of the remaining pad can be detected by the position of the brake caliper in relation to the stationary guide sleeve (see pages 53 - 54).
  • Check that the air suspension has reached ride height and the air bags are not creased. This also applies after rapid loading or unloading.
  • Normal ride level of the air bags, check air bags are not creased. This also applies to rapid loading or unloading.

In the event of daily frost or in accordance with manufacturer’s instructions:
- Drain off condensation water via the drainage valve at the bottom of the air reservoirs.
- Check the valve system.

Quarterly:
- Clean line filter (in accordance with manufacturer’s instructions).

Proper use of the braking system:
- In the event of premature wear of the brake pads, a tractor/trailer harmonisation (according to ISO 20918) is to be carried out.
- To maintain the efficiency of the braking system, regular use of the wheel brakes with the appropriate level of heat generation is recommended.
- Before proceeding with an HU or SP (PTI), the braking system performance where applicable, must be measured (see ISO 7634).
- The appropriate installation and operating instructions for BPW brake components (see www.bpw.de) should be observed.

We wish you a safe journey!
### 3 BPW Trailer axles / BPW Steering axles

#### 3.1 Lubrication

<table>
<thead>
<tr>
<th><strong>Overview</strong></th>
<th>Every 6 weeks</th>
<th>Every 12 weeks</th>
<th>Latest every 26 weeks</th>
<th>Latest every 2 years</th>
<th>Latest every 3 years or min. every 500,000 km</th>
<th>Latest every 3 years</th>
<th>After 5 years, thereafter every 3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Steering pivot bearing, top and bottom</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2</strong> Brake camshaft bearing, outer and inner</td>
<td>2</td>
<td></td>
<td></td>
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<td></td>
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<td>Outside Europe</td>
<td>2</td>
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</tr>
<tr>
<td><strong>3</strong> Slack adjusters manual</td>
<td>3</td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Slack adjuster ECO-Master:</td>
<td>3</td>
<td></td>
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<td></td>
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<td>On-Road conditions</td>
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<tr>
<td>Off-Road conditions</td>
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<tr>
<td>Outside Europe</td>
<td>3</td>
<td></td>
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<tr>
<td><strong>4</strong> Brake shoes with closed anchor eye</td>
<td>4</td>
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<td></td>
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</tr>
<tr>
<td><strong>5</strong> ECO Plus 3, ECO Plus 2 and ECO™ Unit:</td>
<td>5</td>
<td></td>
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<tr>
<td>On-Road conditions</td>
<td>5</td>
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<tr>
<td>Off-Road conditions</td>
<td>5</td>
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<tr>
<td>Outside Europe: On-Road conditions</td>
<td>5</td>
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</tr>
<tr>
<td>Outside Europe: Off-Road conditions</td>
<td>5</td>
<td></td>
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</tr>
</tbody>
</table>

For positions 1 to 3, the use of a high-pressure central lubrication system which is capable of feeding special longlife grease of consistency class 2-3 is permissible. The use of liquid lubricants is not permitted!

1) After a long idle period, prior to initial operation actuate the brake lever and lubricate the brake camshaft bearing.

2) With use under extreme conditions (e.g. extreme Off-Road use) more frequent lubrication with high pressure grease is necessary.
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

Note: After cleaning the vehicle with high-pressure cleaners, all lubrication points must be relubricated.

1 Steering pivot bearing, top and bottom
   – every 6 weeks –

   Lift axle in order to relieve the steering pivot bearing. Grease lubrication nipple with BPW special longlife grease ECO-LiPlus until fresh grease emerges from the bearing points.

2 Brake camshaft bearing, outer and inner

   Low maintenance brake camshaft bearing
   (from year of manufacture 1993)
   – every year and with each brake lining change in
     On-Road use –
   – every 6 months in Off-Road use and in use outside Europe –

   Prevent the vehicle from rolling away.
   Release the service brakes and the handbrake.

   Lubricate the brake camshaft bearing through the grease nipple with BPW special longlife grease ECO-LiPlus until fresh grease emerges from the bearing points.

Important!
Use of other grease is not permitted!

3 Slack adjusters (manual)
   – quarterly –

   Grease lubrication nipple with BPW special longlife grease ECO-LiPlus until fresh grease emerges.

3 Automatic slack adjuster ECO-Master
   – every year and with each brake lining change in
     On-Road use –
   – every 6 months in Off-Road use and in use outside Europe –

   Remove rubber seal cap. Grease with BPW special longlife grease ECO-LiPlus (approx. 80 g) until sufficient new grease emerges from the adjustment bolt.

   Turn back adjustment screw (keep clutch sleeve pressed down) by approx. one turn using a ring spanner. Actuate the brake lever several times by hand. The adjustment must be carried out smoothly. If necessary, repeat several times.

   Once again only use BPW special longlife grease ECO-LiPlus.
   Install seal cap.
   Adjust the brake - see relevant workshop manual.

3 Slack adjusters (manual)
   – quarterly –

   Grease lubrication nipple with BPW special longlife grease ECO-LiPlus until fresh grease emerges.

3 Automatic slack adjuster ECO-Master
   – every year and with each brake lining change in
     On-Road use –
   – every 6 months in Off-Road use and in use outside Europe –

   Remove rubber seal cap. Grease with BPW special longlife grease ECO-LiPlus (approx. 80 g) until sufficient new grease emerges from the adjustment bolt.

   Turn back adjustment screw (keep clutch sleeve pressed down) by approx. one turn using a ring spanner. Actuate the brake lever several times by hand. The adjustment must be carried out smoothly. If necessary, repeat several times.

   Once again only use BPW special longlife grease ECO-LiPlus.
   Install seal cap.
   Adjust the brake - see relevant workshop manual.

4 Brake shoes with closed anchor eye
   – every 2 years and with each brake lining change –

   Clean the bush and roller, check for wear and, if necessary replace. Smear BPW special longlife grease ECO-LiPlus onto bearing points of brake shoe.
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

ECO Plus 3 Unit
– for the first time after 5 years in On-Road use,
or every 3 years in Off-Road use in Europe,
then at least every 3 years depending on operating conditions –
– every 2 years in On-Road use or every year in Off-Road use outside Europe –

Prevent the vehicle from rolling away.
Remove the wheel.
Unscrew the cap with a 110 mm cap spanner.
Dismantle the ECO Unit - see the corresponding workshop manuals.

Mark both the hub and bearing to ensure correct positioning during re-assembly.
It is essential for the bearing inner rings with rollers to be re-inserted in the same hubs.

Thoroughly clean taper roller bearings and seals (using e.g. diesel oil), dry and check for re-useability.
Replace grease seal.
(Recommendation: Renew the tapered roller bearings after 5 years in On-Road and after 3 years in Off-Road use.)

Work BPW special longlife grease ECO-LiPlus thoroughly into the cavities between the taper rollers and the cage in both taper roller bearings.
(For grease quantity see illustration on page 11.)
Smear any residual grease into the hub’s outer bearing race.
Smear the lip of the new seal all round with BPW special longlife grease ECO-LiPlus.
Clean the bearing seats of the axle stub (metal must be bright, dry and free from grease). Spray with BPW ECO Assembly and Protection Spray. Allow to dry for about 10 minutes until the film changes to a marked matt colour.

Install ECO unit whilst continuously rotating axle nut of ECO unit. It should take several turns until the clutch on the axle nut slips.
Important!
Do not use an impact driver.
Fit the retaining key in the groove between the stub axle and the nut (do not reset the axle nut).

Insert the hooked retainer spring behind the formed edge of the axle nut.
Insert a new O-ring into the annular groove of the wheel hub. Apply a thin coat of BPW special longlife grease ECO-LiPlus to the O-ring contact surface and thread of the hub cap.
Screw on the hub cap and tighten to 350 Nm.

BPW special longlife grease ECO-LiPlus

<table>
<thead>
<tr>
<th>Grease quantity per taper roller bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inner bearing</strong></td>
</tr>
<tr>
<td>Manual greasing</td>
</tr>
<tr>
<td>Greasing with a grease applicator</td>
</tr>
<tr>
<td><strong>Outer bearing</strong></td>
</tr>
<tr>
<td>Manual greasing</td>
</tr>
<tr>
<td>Greasing with a grease applicator</td>
</tr>
</tbody>
</table>
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

**ECO Plus 2 Unit**
- for the first time after 5 years in On-Road use, or every 3 years in Off-Road use in Europe, then at least every 3 years depending on operating conditions –
- every 2 years in On-Road use or every year in Off-Road use outside Europe –

Prevent the vehicle from rolling away.
Remove the wheel.
Unscrew the cap with a 120 mm cap spanner.

### Important!
Do not use an impact driver - bayonet lock.
Undo the cap by turning it anti-clockwise by approx. 30° from position 1 to position 2.
When turned further the hub cap lifts clearly away from the ECO Unit and can be removed by pulling it away.

Remove the hooked spring ring and retaining key from the axle bolt.
Unscrew the axle bolt, pulling the complete ECO Unit off the bearing seats of the axle stub as you do so.
Dismantle the ECO Unit - see the corresponding workshop manuals.

Mark both the hub and bearing to ensure correct positioning during re-assembly.
It is essential for the bearing inner rings with rollers to be re-inserted in the same hubs.

Clean the tapered roller bearings thoroughly (e.g. with diesel oil), dry them and check if they can be re-used. Fit a new shaft seal.
(Recommendation: Renew the tapered roller bearings after 5 years in On-Road use and after 3 years in Off-Road use.)

Clean the grease cartridge and fill it on both sides up to the edge with BPW special longlife grease **ECO-LiPlus**. It is important to ensure that it is filled without any trapped air or cavities.

Apply a ring-shaped bead of grease to the running surfaces of the bearing outer races (see arrows in illustration below).

When BPW grease applicators are used, there is no need to fill the grease cartridge or to apply the bead of grease.

Mount the ECO Unit.

Clean the bearing seats of the axle stub (metal must be bright, dry and free from grease). Spray with **BPW ECO Assembly and Protection Spray**. Allow to dry for about 10 minutes until the film changes to a marked matt colour.

<table>
<thead>
<tr>
<th>Greasing</th>
<th>Inner bearing</th>
<th>Outer bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual greasing</td>
<td>170 g</td>
<td>120 g</td>
</tr>
<tr>
<td>Greasing with a grease applicator</td>
<td>130 g</td>
<td>90 g</td>
</tr>
</tbody>
</table>
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

Apply only a thin layer of BPW ECO-LiPlus to the threaded hole in the axle stub.

Important!
Do not apply too much grease!

It is necessary to make sure that the axle bolt can be completely screwed into the axle stub.

Mount the ECO Unit. Guide the toothed lock washer into the hole in the axle stub. The position of the pin can be seen by the punched-in BPW logo in the recess of the axle bolt.

Fasten axle bolt (SW 46) whilst rotating the ECO hub unit. It should take several turns until the clutch on the axle bolt slips.
(Do not turn back the axle bolt).

Important!
Do not use an impact driver.

Insert the retaining key into the recess in the axle bolt and the gearing of the toothed lock washer. (Do not turn back the axle bolt.)

Insert a new O-ring into the groove in the wheel hub.

Apply a thin layer of BPW ECO-LiPlus special longlife grease to the cap in the area of the O-ring contact surface and the bayonet fitting.

Screw on the cap with a 120 mm cap spanner.

Important!
Do not use an impact driver - bayonet lock.

Push on the cap, see position 1.
Press on the cap and turn it by approx. 30° in a clockwise direction to lock it in place. A tight seat is provided when position 2 is reached.

Insert the hooked spring ring into the groove of the hexagon profile of the axle bolt.

Make sure that the hooked spring ring assembly is correctly seated in the annular groove of the axle bolt.
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

**ECO**<sup>Plus</sup> Unit
- for the first time after 5 years in On-Road use, or every 3 years in Off-Road use in Europe, then at least every 3 years depending on operating conditions –
- every 2 years in On-Road use or every year in Off-Road use outside Europe –

Prevent the vehicle from rolling away.
Remove the wheel.
Unscrew the cap with a 110 mm cap spanner.
Dismantle the ECO Unit - see the corresponding workshop manuals.

Mark both the hub and bearing to ensure correct positioning during re-assembly.
It is essential for the bearing inner rings with rollers to be re-inserted in the same hubs.

Thoroughly clean taper roller bearings and seals (using e.g. diesel oil), dry and check for re-useability.
Replace grease seal.
(Recommendation: Renew the tapered roller bearings after 5 years in On-Road and after 3 years in Off-Road use.)

Work BPW special longlife grease ECO<sup>-Li</sup><sup>Plus</sup> thoroughly into the cavities between the taper rollers and the cage in both taper roller bearings.
(For grease quantity see illustration on page 17.)
Smear any residual grease into the hub’s outer bearing race.
Smear the lip of the new seal all round with BPW special longlife grease ECO<sup>-Li</sup><sup>Plus</sup>.

Clean the bearing seats of the axle stub (metal must be bright, dry and free from grease). Spray with BPW ECO Assembly and Protection Spray. Allow to dry for about 10 minutes until the film changes to a marked matt colour.

Install ECO unit whilst continuously rotating axle nut of ECO unit. It should take several turns until the clutch on the axle nut slips.

*Important:*
Do not use an impact driver.
Fit the retaining key in the groove between the axle stub and the nut (do not reset the axle nut).

For production date April 2000 onwards, insert the hooked spring ring behind the edge of the axle nut or, up to March 2000, into the thread on the axle stub. Screw on the cap and tighten to 800 Nm.

---

**BPW special longlife grease ECO-Li<sup>Plus</sup>**

<table>
<thead>
<tr>
<th>Grease quantity per taper roller bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inner bearing</strong></td>
</tr>
<tr>
<td>Manual greasing</td>
</tr>
<tr>
<td>Greasing with a grease applicator</td>
</tr>
</tbody>
</table>
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

ECO Unit
– latest every 3 years or min. every 500,000 km (Western European road conditions), annually in use outside Europe –

Prevent the vehicle from rolling away. Remove the wheel.

Unscrew the cap with a 110 mm cap spanner.

Dismantle the ECO Unit - see the corresponding workshop manuals.

Mark both the hub and bearing to ensure correct positioning during re-assembly.

It is essential for the bearing inner rings with rollers to be re-inserted in the same hubs.

Thoroughly clean taper roller bearings and seals (using e.g. diesel oil), dry and check for re-useability. Replace grease seal.

Work BPW special longlife grease ECO-Li®Plus thoroughly into the cavities between the taper rollers and the cage in both taper roller bearings.

Comply with the total grease quantity in tables A and B.

Smear any residual grease into the hub’s outer bearing race. Smear the lip of the new grease seal all round with BPW special longlife grease ECO-Li®Plus.

Clean the bearing seats of the axle stub (metal must be bright, dry and free from grease). Spray with BPW ECO Assembly and Protection Spray. Allow to dry for about 10 minutes until the film changes to a marked matt colour.

Fit the ECO Unit.

Fasten axle nut using a torque wrench whilst rotating the ECO hub unit. It should take several turns until the tightening torque has reached 150 Nm. Turn the nut back until the next securing position is aligned. (max 15 degrees).

The next locking hole is reached by turning back the asymmetrical axle nut by a maximum of 15°. Fit pin with a snap hook. Tighten the cap to 800 Nm.

<table>
<thead>
<tr>
<th>Axle load</th>
<th>A Inner bearing</th>
<th>B Outer bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000 - 9000 kg</td>
<td>120 g</td>
<td>120 g</td>
</tr>
<tr>
<td>10000 - 12000 kg</td>
<td>170 g</td>
<td>120 g</td>
</tr>
<tr>
<td>13000 - 14000 kg</td>
<td>230 g</td>
<td>150 g</td>
</tr>
</tbody>
</table>
3 BPW Trailer axles / BPW Steering axles

3.1 Lubrication

Change wheel hub bearing grease (Conventional)
– whenever brake linings are changed: at the latest annually or after 150,000 km –

For demounting and re-fitting of wheel hubs, see workshop manuals.

Mark both the hub and bearing to ensure correct positioning during re-assembly.

It is essential for the bearing inner rings with rollers to be re-inserted in the same hubs.

Clean wheel hubs thoroughly inside and outside. Remove old grease completely.

Thoroughly clean taper bearings (using e.g. diesel oil) dry and check for re-useability. Replace seals.

Work BPW special longlife grease ECO-LiPlus into the cavities between the taper rollers and cage.

Comply with total grease quantity (table A), smear any residual grease into the hub’s outer bearing race.

Fit wheel hubs and adjust bearing play (see point 7 page 38).

Fill hub caps with BPW special longlife grease ECO-LiPlus (table B) and screw on.

For tightening torques see 5 page 31.

For 16 - 18 t axles with BPW oval shape hub cap, a new O-ring must be fitted on reassembly.

**BPW special longlife grease ECO-LiPlus**

<table>
<thead>
<tr>
<th>Axle load (Series H, K, N, M)</th>
<th>A Inner bearing</th>
<th>B Outer bearing (cap filling)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4000 - 5500 kg</td>
<td>80 g</td>
<td>130 g</td>
</tr>
<tr>
<td>6000 - 9000 kg</td>
<td>170 g</td>
<td>290 g</td>
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<tr>
<td>10000 - 12000 kg</td>
<td>180 g</td>
<td>320 g</td>
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<td>13000 - 14000 kg</td>
<td>240 g</td>
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<td>16000 - 18000 kg</td>
<td>400 g</td>
<td>800 g</td>
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<td>20000 kg</td>
<td>440 g</td>
<td>900 g</td>
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<table>
<thead>
<tr>
<th>Axle load (Series E and NE)</th>
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</thead>
<tbody>
<tr>
<td>3000 kg</td>
</tr>
<tr>
<td>3500 - 3800 kg</td>
</tr>
<tr>
<td>4500 kg</td>
</tr>
</tbody>
</table>
BPW Trailer axles / BPW Steering axles

3

Maintenance Work and Visual Inspection

3.2

General 3.2.1

In order to distribute the braking effort evenly to all the brakes in the unit, adjustment must always be carried out according to the vehicle manufacturer’s specifications, or after 5,000 km. Tractor units with EBS cannot have their brakes adjusted in the normal manner. As a result, the trailer or semi-trailer merely has to be checked for compliance with the EC tolerance bands. Always check the tractor vehicle if the trailer is in the EC band despite premature brake pad wear. The EBS parameters in the tractor unit must be modified in order to improve compatibility, see ECE R 13 in this connection. Failure to do so will invalidate the warranty (see warranty documents).

Other possible solutions to premature brake pad wear:
- Prescribed maintenance work must be performed at regular intervals.
- Use the retarder or engine brake to adjust the vehicle’s speed.
- Think ahead when driving.
- Drop down to a lower gear in good time.
- BPW Disc Protector (cover plates for brake discs).

Even at high temperatures, disc brakes display stable braking properties and a high level of safety. Excessive temperatures do not make themselves apparent through brake fading and should be avoided. This effect leads to increased wear when used under these conditions.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

Overview

For detailed description, see pages 26 - 39
Disc brakes, see pages 40 - 62
Air suspension, see pages 64 - 84
Suspension, see pages 86 - 95

<table>
<thead>
<tr>
<th>Maintenance work - Drum brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initially</strong></td>
</tr>
</tbody>
</table>

1) Check wheel nuts for tightness.

2) With manual slack adjusters, check brake play, adjust if necessary to 10 - 12% of the connected brake lever length and activate by hand or with 0.5 - 0.8 bar. (Not applicable in the case of automatic slack adjusters.)

3) Check the tyres for uneven wear, adjust the inflation pressure if necessary, according to the manufacturer’s specifications.

4) Check brake lining thickness is at least 5 mm. (Brake SN 300 min. 7 mm and N 3006 min. 2.5 mm residual lining thickness.)

5) Check brake drum for cracks and check the internal diameter.

6) Check caps for firm seating (not necessary with ECO Plus 3, ECO Plus 2 and ECO Plus axles).

7) Check operation of automatic slack adjusters.

8) Visual inspection of all component parts and welding seams for damage and wear.

9) Check wheel hub bearing play, adjust if necessary.

- ECO Plus 3, ECO Plus 2 and ECO Plus axles
- ECO Unit, conventional bearing

1) After the first run under load conditions, likewise after each wheel change.
2) Under extreme conditions, increase frequency (e.g. construction sites and poor roads).
3) For use outside Europe.

Note: Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

Check wheel nuts for tightness
– the tightening torque of the wheel nuts must be checked after the first high load journey as well as after each wheel change and, if appropriate, retightened to the prescribed value –

Tighten wheel nuts diagonally using a torque wrench to the tightening torque shown in the table. In the case of Trilex-wheels tighten the nuts consecutively several times around.

Wheel contact surfaces should not have additional coats of paint (risk of the wheels becoming detached)

Tightening torque for wheel nuts

It is imperative that the prescribed tightening torques are adhered to in order to ensure the wheels are securely fastened! The wheel studs must be clean and free of damage and the nuts must be easily tightened and loosened. If needed, lightly oil the contact surface between the wheel nut and the pressure disc. Do not oil or grease the thread of the wheel studs and wheel nuts.

<table>
<thead>
<tr>
<th>Stud alignment</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 14 x 1.5</td>
<td>125 Nm (120 - 130 Nm)</td>
</tr>
<tr>
<td>M 18 x 1.5</td>
<td>290 Nm (275 - 305 Nm)</td>
</tr>
<tr>
<td>M 20 x 1.5</td>
<td>380 Nm (360 - 400 Nm)</td>
</tr>
<tr>
<td>M 22 x 1.5</td>
<td>510 Nm (485 - 535 Nm)</td>
</tr>
<tr>
<td>M 22 x 2</td>
<td>460 Nm (435 - 485 Nm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spigot alignment</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 18 x 1.5</td>
<td>350 Nm (330 - 370 Nm)</td>
</tr>
<tr>
<td>M 20 x 1.5</td>
<td>480 Nm (455 - 505 Nm)</td>
</tr>
<tr>
<td>M 22 x 1.5</td>
<td>630 Nm (600 - 660 Nm)</td>
</tr>
<tr>
<td>M 22 x 1.5 alloy wheels</td>
<td>630 Nm (600 - 660 Nm)</td>
</tr>
<tr>
<td>M 24 x 1.5</td>
<td>860 Nm (820 - 900 Nm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trilex-wheels</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 18 x 2</td>
<td>285 Nm (270 - 300 Nm)</td>
</tr>
<tr>
<td>M 20 x 2</td>
<td>335 Nm (320 - 350 Nm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Japan connection</th>
<th>Tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 20 x 1.5</td>
<td>570 Nm (540 - 600 Nm)</td>
</tr>
<tr>
<td>M 30 x 1.5</td>
<td>570 Nm (540 - 600 Nm)</td>
</tr>
</tbody>
</table>

The torque values shown below can be achieved using a normal wheel nut spanner (vehicle tool kit) and a length of tubing.

However always check with a torque wrench as soon as possible afterwards.

To achieve tightening torques with on-board tools

<table>
<thead>
<tr>
<th>Tightening torque</th>
<th>Tubing length „A“</th>
<th>Tubing length „B“</th>
</tr>
</thead>
<tbody>
<tr>
<td>270 - 310 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300 mm</td>
<td>90 - 105 kg</td>
<td></td>
</tr>
<tr>
<td>350 mm</td>
<td>78 - 89 kg</td>
<td></td>
</tr>
<tr>
<td>400 mm</td>
<td>68 - 78 kg</td>
<td></td>
</tr>
<tr>
<td>320 - 350 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350 mm</td>
<td>91 - 99 kg</td>
<td></td>
</tr>
<tr>
<td>400 mm</td>
<td>80 - 88 kg</td>
<td></td>
</tr>
<tr>
<td>450 mm</td>
<td>71 - 78 kg</td>
<td></td>
</tr>
<tr>
<td>500 mm</td>
<td>64 - 70 kg</td>
<td></td>
</tr>
<tr>
<td>360 - 400 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 mm</td>
<td>90 - 99 kg</td>
<td></td>
</tr>
<tr>
<td>450 mm</td>
<td>80 - 89 kg</td>
<td></td>
</tr>
<tr>
<td>500 mm</td>
<td>72 - 80 kg</td>
<td></td>
</tr>
<tr>
<td>600 mm</td>
<td>60 - 67 kg</td>
<td></td>
</tr>
<tr>
<td>440 - 480 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 mm</td>
<td>88 - 96 kg</td>
<td></td>
</tr>
<tr>
<td>600 mm</td>
<td>73 - 80 kg</td>
<td></td>
</tr>
<tr>
<td>700 mm</td>
<td>63 - 69 kg</td>
<td></td>
</tr>
<tr>
<td>480 - 540 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 mm</td>
<td>80 - 90 kg</td>
<td></td>
</tr>
<tr>
<td>700 mm</td>
<td>67 - 77 kg</td>
<td></td>
</tr>
<tr>
<td>800 mm</td>
<td>60 - 67 kg</td>
<td></td>
</tr>
<tr>
<td>600 - 660 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700 mm</td>
<td>85 - 95 kg</td>
<td></td>
</tr>
<tr>
<td>800 mm</td>
<td>75 - 83 kg</td>
<td></td>
</tr>
<tr>
<td>900 mm</td>
<td>67 - 73 kg</td>
<td></td>
</tr>
<tr>
<td>1000 mm</td>
<td>60 - 66 kg</td>
<td></td>
</tr>
<tr>
<td>820 - 900 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000 mm</td>
<td>82 - 90 kg</td>
<td></td>
</tr>
</tbody>
</table>
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

2 Check and adjust wheel brake play with manual slack adjusters
   – frequent checks are necessary –
   – depending upon application every 1 to 3 weeks –

   Actuate slack adjusters by hand, pulling against the return spring. If there is more than 35 mm of play, the slack adjuster must be reset. This can be done by adjusting the nut on the slack adjuster as shown.

   Adjust the play “a” to 10 -12% of the connected brake lever length “B”, e.g. lever length 150 mm = 15 - 18 mm of play.

   Automatic slack adjusters make this adjustment automatically whenever the camshaft is rotated by more than 17.5°.

3 Check brake lining thickness
   – quarterly –

   Open inspection hole by folding back the rubber flap (not required with ECO Drum brakes).

   The brake lining should be replaced at a residual lining thickness of 5 mm, SN 300 min. 7 mm, N 3006 min. 2.5 mm (check with slide gauge) or on reaching the bottom of the indicator machined into the edge of the lining.

   Re-insert the rubber flap.

   If brake lining wear indicators are fitted to the slack adjusters, the minimum thickness of the brake linings is indicated by the horizontal position of the lever (when the brake is released).

   The Brake Monitor displays the “Service” signal when the wear sensor for drum brakes is installed. There is no warning function.

   In certain cases the slack adjusters may not be fitted in the normal (i.e. vertical) position. In such instances, the position of the wear indicator will also be different. Linings should be changed when the wear indicator is approximately at right angles to the brake lever.

Check the tyres for uneven wear, adjust the inflation pressure if necessary according to the manufacturer’s specifications.
   – quarterly –
3  BPW Trailer axles / BPW Steering axles

3.2  Maintenance Work and Visual Inspection

3.2.2  Drum brakes

4  Check the brake drum for cracks and the internal diameter – quarterly –

Check the condition of the brake drum and that there is adequate remaining thickness. If the wear is approaching the wear edge, measure the brake drum and renew it if the maximum permitted amount of wear has been reached.

Max. amounts of wear, measured at the position with the greatest wear:

<table>
<thead>
<tr>
<th>Brake</th>
<th>Brake shoe width (mm)</th>
<th>Ø Max. amount of wear (mm)</th>
<th>Ø Skimming size (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN 420</td>
<td>120 / 160</td>
<td>424</td>
<td>423</td>
</tr>
<tr>
<td>SN 420</td>
<td>180 / 200 / 220</td>
<td>425.5</td>
<td>424</td>
</tr>
<tr>
<td>SN 360</td>
<td>160 / 200</td>
<td>364</td>
<td>363</td>
</tr>
<tr>
<td>SN 300</td>
<td>100 / 150 / 200</td>
<td>304</td>
<td>303</td>
</tr>
<tr>
<td>FL 300</td>
<td>80</td>
<td>303</td>
<td>302</td>
</tr>
</tbody>
</table>

5  Check caps for firm seating – every 6 months – (not necessary with ECO Plus 3, ECO Plus 2 and ECOPlus axles)

Check caps for tightness using a torque wrench or power tool. Tightening torque:

Hub caps with BPW oval shape:
- ECO Plus 3 Unit 8 - 12 t SW 110 350 Nm
- ECOPlus Unit 8 - 12 t SW 110 800 Nm
- ECO Unit 6.5 - 14 t SW 110 800 Nm
- Steel hub cap for conventional bearing hub (oval):
  - 6.5 - 9 t SW 95 500 Nm
  - 10 - 12 t SW 110 500 Nm
  - 13 - 14 t SW 120 800 Nm
  - 16 - 18 t SW 140 350 Nm
- Alloy cap 6 - 12 t SW 110 350 Nm

Hub cap with octagonal shape:
- 13 - 20 t SW 120 700 Nm

In an emergency the caps can be tightened using a normal cap spanner (vehicle tool kit) by striking the latter with a hammer, or also with the aid of a piece of tubing placed over the wheel nut.

Caps with integrated hubodometers must be fitted and dismantled using only torque controlled (DO NOT USE AIR IMPACT WRENCHES!) air guns or manually with a torque wrench.

Tighten to the correct tightening torque as soon as possible.

6  Caps on ECO Plus 2 axles are provided with a bayonet fitting. Check for firm seating.

Position 1: Hub cap seated loosely on the Unit.
Position 2: Hub cap seated firmly on the Unit.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

6 Check operation of the automatic slack adjusters
   - every 6 months –
   - quarterly in use outside Europe (e.g. within the scope of the statutory checks) –

   Prevent the vehicle from rolling away.
   Release the service brakes and the handbrake.

   Free play check:
   Operate the slack adjuster by hand or with 0.8 bar. In this case, the free play “a” corresponds to 10 - 15 %
   of the connected brake lever length “B”, e.g. brake lever length 150 mm = free play 15 - 22 mm.

   Check the adjustment if the free play is not within tolerance:
   Remove rubber seal cap. Keep clutch sleeve pressed down and turn back adjustment bolt (arrow) by approx. 3/4 of a turn in a counterclockwise direction using a ring spanner. A play of at least 50 mm with a lever length of 150 mm must be available.
   Actuate the brake lever several times by hand.
   When this is done automatic adjustment must take place smoothly. Engagement of the clutch coupling is audible and on the return stroke the adjustment bolt turns slightly in a clockwise direction. Grease with ECO-LiPlus, see also 3 on page 9.
   Fit seal cap.
   Adjust the brake, see relevant workshop manual.

7 Check wheel hub bearing play
   - ECO Plus 3, ECO Plus 2 and ECOUnit at every brake lining replacement, latest annually –
   - ECO Unit und conventional hub bearing every 6 months –

   Prevent the vehicle from rolling away.
   In order to check the wheel hub bearing play, lift the axle until the wheels are off the ground.
   Release the brake. Apply a lever between the tyre and the ground and check the play.

   If bearing play is detected - ECO Plus 3 Unit:
   Adjust the bearing play
   1. Unscrew the cap.
   2. Remove the hooked spring ring with a wedge from the axle nut.
   3. Fasten axle nut using a hexagon socket spanner whilst rotating the ECO hub unit.
   It is necessary to turn the ECO Unit numerous times before the gearing slips over the axle nut.
   Attention!
   Do not use an impact driver.
   4. Fit the retaining key in the groove between the stub axle and the nut (do not reset the axle nut).
   5. Insert the hooked retainer spring behind the formed edge of the axle nut.
   6. Insert a new O-ring into the annular groove of the wheel hub.
   Apply a thin coat of BPW special long-life grease ECO-LiPlus to the O-ring contact surface and thread of the hub cap.
   7. Screw on the hub cap and tighten to 350 Nm.

Visual inspection
   - every 6 months –
   - quarterly in use outside Europe –

   Check all components and welding seams for damage and wear.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

If bearing play is detected - ECO Plus 2 Unit:

Adjust the bearing play

1. Unscrew the cap with a 120 mm hub cap spanner. Undo the cap by turning it anti-clockwise by approx. 30° from position 1 to position 2.

   When turned further the hub cap lifts clearly away from the ECO Unit and can be removed by pulling it away.

   **Attention!**
   Do not use an impact driver - bayonet lock.

2. Remove the hooked spring ring and retaining key from the axle bolt.

3. Tighten the axle bolt (SW 46) using a hexagon socket spanner whilst simultaneously rotating the ECO hub unit.

   It is necessary to turn the ECO Unit numerous times before the gearing slips over the axle bolt.

   **Attention!**
   Do not use an impact driver.

4. Insert the retaining key into the recess in the axle bolt and the gearing of the toothed lock washer (arrow). (Do not turn back the axle bolt.)

5. Insert the hooked spring ring into the groove of the hexagon profile of the axle bolt. Make sure that the hooked spring ring assembly is correctly seated in the annular groove of the axle bolt.

6. Insert a new O-ring into the groove in the wheel hub.

7. Apply a thin layer of BPW ECO-Li Plus special longlife grease to the hubcap in the area of the O-ring contact surface and the bayonet fitting.

8. Screw on the cap with a 120 mm cap spanner.

   **Attention!**
   Do not use an impact driver - bayonet lock.

   Push on the hubcap, see position 1. Press on the hubcap and turn it by approx. 30° in a clockwise direction to lock it in place. A tight seat is provided when position 2 is reached.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.2 Drum brakes

If bearing play is detected - ECO\textsuperscript{Plus} Unit:

Adjust the bearing play

1. Unscrew the cap.
2. Remove the hooked spring ring with a wedge from the axle nut.
3. Fasten axle nut using a hexagon socket spanner whilst rotating the ECO Unit. It is necessary to turn the ECO Unit numerous times before the gearing slips over the axle nut.

Attention!
Do not use an impact driver.

4. Fit the retaining key in the groove between the axle stub and the nut (do not reset the axle nut).
5. For production date April 2000 onwards, insert the hooked spring ring behind the edge of the axle nut or, up to March 2000, into the thread on the axle stub.
6. Tighten the cap to 800 Nm.

If bearing play is detected - ECO Unit:

Adjust the bearing play

1. Unscrew the cap.
2. Loosen axle nut.
3. Fasten axle nut using a torque wrench whilst rotating the ECO hub unit. It should take several turns until the tightening torque has reached 150 Nm.

- If a normal axle nut spanner is used (vehicle tool kit), tighten the axle nut until the ECO Unit drags slightly (auxiliary solution).
4. Turn back axle nut to the next locking position (max. 15°). The asymmetrical cap of the axle nut enables the next locking position to be reached after turning back max. 15°.
5. Insert bolt and locking ring.
6. Screw on caps.

Tightening torque:

<table>
<thead>
<tr>
<th>Material</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel / cast cap</td>
<td>800</td>
</tr>
<tr>
<td>Aluminium cap</td>
<td>350</td>
</tr>
</tbody>
</table>
If bearing play is detected
- conventional hub bearing:
  Adjust the bearing play
  1. Unscrew the cap.
  2. Remove the split pin from the axle nut.
  3. Fasten the axle nut using a torque wrench and with the continuous turning of the wheel hub. It should take several turns until the tightening torque has reached the desired value.

  Tightening torques:
  - hub caps with BPW oval shape: Up to an axle load of 5.5 tons (up to calendar week 38/2011) = 100 Nm, from 6 to 18 tons axle load = 150 Nm,
  - hub caps with octagonal shape: from 16 to 30 tons axle load = 350 Nm

  - If a normal axle nut spanner is used (vehicle tool kit), tighten the axle nut until the wheel bearing race drags slightly.

  4. Turn back the axle nut to the next available split pin hole. Should they already be in line turn back to the next hole (30° at the maximum). (Does not apply to the ECO Plus 3, ECO Plus 2, ECO Plus and ECO Unit.)

  5. Insert the split pin and bend upwards slightly.

  6. Refill the cap as required with BPW special longlife grease ECO-Li Plus and replace.

Tightening torques see point 5 on page 31.

For tightening torques see point 5 on page 31.

For 16 - 18 t axles with BPW oval shape hub cap, a new O-ring must be fitted on reassembly.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.3 Disc brakes, brake types: TSB 3709, TSB 4309, TSB 4312

<table>
<thead>
<tr>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>For detailed description, see pages 42 - 48</td>
</tr>
<tr>
<td>Disc brakes type SB, see pages 50 - 62</td>
</tr>
<tr>
<td>Air suspension, see pages 64 - 84</td>
</tr>
<tr>
<td>Suspension, see pages 86 - 95</td>
</tr>
</tbody>
</table>

| Maintenance work - Disc brakes |
| Brake type: TSB 3709, TSB 4309, TSB 4312 |

| 1 | Check wheel nuts for tightness. | Initially |
| 2 | Check brake pad thickness. | Every 12 weeks |
| 3 | Visual check, check all components and welding seams for damage, wear and corrosion. | Every 26 weeks |
| 4 | Check brake disc thickness and visually check for cracks. | At every brake lining replacement, latest annually |
| 5 | Check caliper guide system. | |
| 6 | Check coarse dirt seals and the pressure plates. | |
| 7 | Check the bearing play of the ECO Unit, adjust if necessary. | |

- Under extreme conditions, increase frequency (e.g. Off-Road, heavy-duty braking work).
- After the first run under load conditions and likewise after each wheel change.
- For use outside Europe.

Note: Components that have damages due to improper mounting are to be exchanged after a review by a BPW Service Centre.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.3 Disc brakes, brake types: TSB 3709, TSB 4309, TSB 4312

1 Check wheel nuts for tightness
   - the tightening torque of the wheel nuts must be
   checked after the first laden load journey as well
   as after each wheel change and, if appropriate,
   retightened to the prescribed value –

   Tighten wheel nuts diagonally using a torque
   wrench to the correct tightening torque.

   It is imperative that the prescribed
   tightening torques are adhered to in
   order to ensure the wheels are securely
   fastened!

   The wheel studs must be clean and free
   of damage and the nuts must be easily
   tightened and loosened. If needed, lightly
   oil the contact surface between the wheel
   nut and the pressure disc. Do not oil or
   grease the thread of the wheel studs and
   wheel nuts.

   Tightening torques for wheel nuts M 22 x 1.5:
   Stud alignment:  510 Nm (485 - 535 Nm)
   Spigot alignment:  630 Nm (600 - 660 Nm)

   Attention: Do not exceed specified settings!

   Wheel contact surface should not have addi-
   tional coats of paint (risk of the wheels becoming
   detached)!

2 Check brake pad thickness
   - quarterly –

   The brake pad thickness must be checked regularly,
   e.g. during the tyre inflation pressure check. The
   intervals must not be more than 3 months.

   The brake pad thickness can be checked where
   the brake caliper interfaces with the welded anchor
   plate with the wheels mounted (approximate wear
   indicator).

   Dimension x (distance between brake caliper and
   brake anchor plate):
   9 mm => when new
   30 mm => max. permissible brake
   pad wear, 21 mm
   34 mm => max. permissible wear for
   brake pad and brake disc
   TSB 4312
   28 mm => max. permissible brake
   pad wear, 19 mm
   32 mm => max. permissible wear for
   brake pad and brake disc

   The brake pads must be removed to inspect them
   more closely - see relevant workshop manual.

   Heat affected, glazed over, or oily brake pads must
   be replaced immediately.

   The remaining brake pad thickness must not
   be less than 2 mm (use a caliper gauge for this).

   Hairline cracks at the edges are permissible;
   replacement is required if more sizable surface
   cracks are present.

3 Visual inspection
   - every six months –

   Check all components and welding seams for da-
   mage, wear and corrosion.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.3 Disc brakes, brake types: TSB 3709, TSB 4309, TSB 4312

---

### Brake disc

**Check the condition of the brake disc**

- every 6 months when used within Europe,
- quarterly when used outside Europe –

Sections **A - D** (see fig.) show the possible conditions of the disc surface:

- **A:** Network-type tears = permissible
- **B:** Radial cracks up to max. 1.5 mm width and depth = permissible
- **C:** Uneven disc surface less than 1.5 mm = permissible
- **D:** Continuous cracks = not permissible

Technical details:
- Disc thickness, new = 45 mm
- Minimum permissible disc thickness = 37 mm
  (Use a caliper gauge where the pads make contact)

In the case of surface conditions **A - C**, the brake disc can be used until the minimum permissible disc thickness has been reached.

---

### Checking the brake caliper guide system

**Check play and adjustment**

- every 6 months when used within Europe,
- quarterly when used outside Europe –

(e.g. within the scope of the statutory checks)

Prevent the vehicle from rolling away.
Release the service and parking brakes.

The brake cylinder and fasteners for the brake pads can remain fitted.

Forcefully push the sliding caliper in the axle direction. The caliper must move approximately 0.7 to 1.3 mm (play).

If play is not within this tolerance, the brake caliper guide must be checked and readjusted.

For close inspection of play with **wheels mounted**:

Use a dial gauge to determine the play. To this end, attach a dial gauge holder to the axle housing and position the button on the outside of the screw plug (1) or on the brake cylinder.

---

### Attention!

To prevent damage to the brake discs, the brake pads should be replaced when the minimum thickness (excluding backing plate) is 2 mm or less.

Brake discs should always be replaced in pairs. The brake pads should also be replaced when new brake discs are fitted.

If this instruction is not adhered to, there is a danger that with the worn brake pads the brake disc will be damaged and the braking performance could be seriously reduced.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.3 Disc brakes, brake types: TSB 3709, TSB 4309, TSB 4312

Set play and check adjustment

1. Remove the plug.

2. Using a torx wrench (T25), depress the return spring and turn clockwise until it “clicks” 2 times.

3. Actuate the brake 5 to 10 times with a force of approximately 2 bar.

4. Forcefully push the sliding caliper in the axle direction. The play exhibited at this time must be between 0.7 and 1.3 mm.

5. Reinsert the plug.

Check brake caliper guide:

The brake caliper guide must be checked if the play was not adjusted properly.

The guide bushings are sealed by the bellows (4) and the screw plug (1).

Inspect the bellows and sealing plugs for cracks, damage and proper seating and replace if necessary.

Sealing plugs that have been removed must be replaced, not re-used.

See workshop manual ECO Disc for information on how to repair the brake caliper guide.

Check the brake caliper bearing play:

The bearing play of the brake caliper can be established using a dial gauge. Attach the dial gauge holder to the axle beam and position the gauge, facing the long locating bearing, on the lower edge of the cylinder flange.

Press the brake caliper on the brake cylinder vertically downwards to its installation position and set the dial gauge to “zero”. Press the brake caliper upwards and read the bearing play on the dial gauge. If a brake caliper bearing play exceeds 1.5 mm, the brake caliper bearing must be replaced.

Check coarse dirt seals and the tappets

– at every brake lining replacement, latest annually in Europe –
– every six months in use outside Europe –

Prevent the vehicle from rolling away.
Release the service and parking brakes.

See workshop manual ECO Disc for information on how to remove the brake pads.

The service brake and spring actuator must be released.

With a vernier gauge, measure the diameter of the concentric pin on the two thrust pieces.

When it reaches a minimum of 8 mm, change the thrust piece.

To change the thrust piece, see workshop manual ECO Disc.

Unscrew the tappets beyond the adjuster (min. 30 mm) until the coarse dirt seals are plainly visible.

Ensure proper seating.
(Visual inspection, see detail extract)

Check the dust cover of the brake caliper in the area between the coarse dirt seals (arrows) for deformation. If deformation is detected, the brake caliper requires changing!

Note:
Penetrating dirt and damp cause corrosion and affect the operation of the clamping mechanism and adjustment.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.3 Disc brakes, brake types: TSB 3709, TSB 4309, TSB 4312

The bellows must be replaced if thermal overloading was detected.

Only new parts may be used.

The adjustment device must be checked for corrosion and ease of movement before the new parts are installed.

See workshop manual ECO Disc for information on how to replace the bellows.

Check the bearing play of the ECO Unit

– at every brake lining replacement, latest annually –

Prevent the vehicle from rolling away.

In order to check the bearing play of the ECO Unit, lift the axle until the wheels are off the ground. Release the brake. Apply a lever between the tyre and the ground and check the play.

The bearing play must be reset if the bearing play can be felt.

See instructions on setting bearings for ECO Plus 3, ECO Plus 2 and ECO\textsuperscript{Grh}, pages 33 to 36.
### 3 BPW Trailer axles / BPW Steering axles

#### 3.2 Maintenance Work and Visual Inspection

#### 3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

**Overview**

For detailed description, see pages 52 - 62
Disc brakes type TSB, see pages 40 - 48
Air suspension, see pages 64 - 84
Suspension, see pages 86 - 95

<table>
<thead>
<tr>
<th>Maintenance work - Disc brake</th>
<th>Initial</th>
<th>Every 12 weeks</th>
<th>Every 26 weeks</th>
<th>At every brake lining replacement, latest annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake type: SB 3308, SB 3745, SB 4309, SB 4345</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Check wheel nuts for firm seating.
2. Check brake pad thickness.
3. Check the tyres for uneven wear, adjust the inflation pressure if necessary according to the manufacturer's specifications.
4. Visual check of all components and welding seams for damage, wear and corrosion.
5. Check brake disc thickness and visually check for cracks.
6. Check brake adjustment.
7. Check caliper guide system.
8. Check bellows on the guide pins.
   - ECO Plus 2 and ECOPlus axles
   - ECO axles and axles with conventional hub bearing
9. Check caliper unit.
   - ECO Plus 2 and ECOPlus axles
   - ECO axles and axles with conventional hub bearing
10. Check wheel hub bearing play, adjust if necessary.
    - ECO Plus 2 and ECOPlus Unit
    - ECO Unit and conventional hub bearing
11. Check caps for tightness. (not necessary with ECO Plus 2 and ECOPlus axles)

Note: Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

1 Check wheel nuts for tightness

- the tightening torque of the wheel nuts must be checked after the first laden load journey as well as after each wheel change and, if appropriate, realigned to the prescribed value.

Tighten wheel nuts diagonally using a torque wrench to the correct tightening torque.

It is imperative that the prescribed tightening torques are adhered to in order to ensure the wheels are securely fastened!

The wheel studs must be clean and free of damage and the nuts must be easily tightened and loosened. If needed, lightly oil the contact surface between the wheel nut and the pressure disc. Do not oil or grease the thread of the wheel studs and wheel nuts.

Tightening torques for wheel nuts:

<table>
<thead>
<tr>
<th>Stud alignment</th>
<th>Spigot alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 18 x 1.5</td>
<td></td>
</tr>
<tr>
<td>Stud alignment</td>
<td>290 Nm (275 - 305 Nm)</td>
</tr>
<tr>
<td>Spigot alignment</td>
<td>350 Nm (330 - 370 Nm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stud alignment</th>
<th>Spigot alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 22 x 1.5</td>
<td></td>
</tr>
<tr>
<td>Stud alignment</td>
<td>510 Nm (485 - 535 Nm)</td>
</tr>
<tr>
<td>Spigot alignment</td>
<td>630 Nm (600 - 660 Nm)</td>
</tr>
</tbody>
</table>

Attention: Do not exceed specified settings!
Wheel contact surface should not have additional coats of paint (risk of the wheels becoming detached)!

2 Check brake pad thickness

SB 3745 / SB 4309 / SB 4345

- quarterly -

The brake pad thickness must be checked regularly, e.g. during the tyre inflation pressure check. The intervals must not be more than 3 months.

The thickness of the remaining pad must not be less than 2 mm (check with slide gauge).

Open bearing:

The thickness of the brake pad can be checked by the position of the brake caliper (1) in relation to the guide rod (2) (approximate indication of wear) with the wheels attached.

If the end of the guide sleeve (3) is level with the fixed guide rod, the pad thickness must be checked again after the wheels have been removed.

Sealed bearing:

The sealed bearing has a ridged rubber seal which is fitted over the guide pin. Pad wear should be checked when the wear mark (transition point between the ridged and smooth areas - see diagram) has moved to the end of the guide pin.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

Check brake pad thickness
SB 3308
– quarterly –

The brake pad thickness must be checked regularly, e.g. during the tyre inflation pressure check. The intervals must not be more than 3 months.

The thickness of the remaining pad must not be less than 2 mm (check with slide gauge).

The brake pad thickness can be checked with the wheels attached by means of the position of the brake caliper marking (P) in relation to the fixed brake carrier flange (R).

On reaching the status as shown in the illustration below right, the brake pad thickness and the brake disc must be checked with the wheel removed.

Replace the brake pads and/or brake disc as necessary.

Check the tyres for uneven wear and adjust the inflation pressure if necessary according to the manufacturer’s specifications
– quarterly –

Visual inspection
– every six months –

Check all components and welding seams for damage, wear and corrosion.

Brake disc
(Change the condition of the brake disc)
– every 6 months –
– quarterly in use outside Europe –

Section A - D (see fig.) show the possible conditions of the disc surface:
A: Network-type tears = permissible
B: Radial cracks up to max. 1.5 mm width and depth = permissible
C: Uneven disc surface less than 1.5 mm = permissible
D: Continuous cracks = not permissible

In the case of surface conditions A - C the brake disc can be used until the minimum permissible disc thickness has been reached.

Attention!
To prevent damage to the brake discs, the brake pads should be replaced when their thickness (excluding backing plate) is 2 mm or less.

If this instruction is not adhered to, there is a danger that with the worn brake pads the brake disc will be damaged and the braking performance could be seriously reduced.

Check brake pad thickness
SB 3308
– quarterly –

Visual inspection
– every six months –

Brake disc
(Change the condition of the brake disc)
– every 6 months –
– quarterly in use outside Europe –

Section A - D (see fig.) show the possible conditions of the disc surface:
A: Network-type tears = permissible
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3  BPW Trailer axles / BPW Steering axles

3.2  Maintenance Work and Visual Inspection

3.2.4  Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

Check adjustment
– every 6 months –
– quarterly in use outside Europe –

Prevent the vehicle from rolling away.
Release the service brakes and the handbrake.

SB 3308
Remove wheel. Remove pad retainer clip. Pull the brake caliper on its guide pins in the direction of the outside of the vehicle.

Using a suitable tool, press the outer brake pad in the direction of the tappet. Measure the gap between the backing plate and the inside of the caliper. This must be between 0.6 and 1.1 mm.

Attention!
If the air gap is too large, the braking effect may fail.
If the air gap is too small, brake may overheat and cause further damage.
If the air gap is too big or too small, the adjustment must be checked as follows:

Repeat with a new adapter. Fit a new brake caliper if the adapter shears off again - this is an indication of internal damage.

Do not use an open-ended spanner.

Max. torque: approx. 25 Nm

SB 3745 / SB 4309 / SB 4345

Technical details:

- Disc thickness, new = 45 mm
- Minimum permissible disc thickness (check with slide gauge) = 37 mm

SB 3308

Technical details:

A Disc thickness, new = 34 mm
minimum permissible disc thickness (check with slide gauge) = 28 mm
C1 Overall thickness of new brake pad = 27 mm
C2 Overall thickness of new brake pad = 34 mm
D1 Pad backing plate = 8 mm
D2 Pad backing plate = 15 mm
E Brake pad minimum thickness = 2 mm
F1 Brake pad minimum thickness incl. pad backing plate = 10 mm
F2 Brake pad minimum thickness incl. pad backing plate = 17 mm

Technical details:

• Disc thickness, new = 45 mm
• Minimum permissible disc thickness (check with slide gauge) = 37 mm

SB 3745 / SB 3745 / SB 4309 / SB 4345

Remove cap. Place a ring spanner size 8 on the hex. profile of the adjuster, or a spanner size 10 on the adjuster adapter. Turn anti-clockwise until the ratchet clicks 3 or 4 times.

Attention!
If the version has an adjustment adapter, never turn without the adapter. Exceeding the specified break-off torque of the adapter will cause the adapter to break.
Repeat with a new adapter. Fit a new brake caliper if the adapter shears off again - this is an indication of internal damage.

Do not use an open-ended spanner.

Max. torque: approx. 25 Nm
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

Apply brake 5 to 10 times (approximately 2 bar). If the adjustment is correct, the ring spanner will turn back in a clockwise direction (make sure the ring spanner can rotate freely).

Note: As the cycle rate increases, the movement of the ring spanner, becomes smaller.

If the ring spanner moves as described, the adjustment is then OK.

Remove ring spanner.

Apply Renolit HLT2 to the cap and re-fit. For the version with the adapter, fit the lug on the cap pointing towards the axle beam.

The adjuster or the ring spanner:
   a) does not turn,
   b) turns only upon initial application,
   c) turns forward and back again upon each application,

the adjustment is not correct and the brake caliper must be replaced.

5 Check the brake caliper guide system
   - every 6 months –
   - (e.g. within the scope of the statutory checks)
   - quarterly in use outside Europe –

Prevent the vehicle from rolling away.
Release the service brakes and the handbrake.

Apply considerable pressure to the sliding caliper in the direction of the guide bearing. It should be possible to move it by about 0.5 to 1 mm (play).
Check the brake caliper guide if this is not the case.

SB 3745 / SB 4309 / SB 4345

The guide bush (1a) is sealed by the bellows (2) and the sheet metal cap (3) with the sealing ring (4).
Parts (2) and (3) must not be split or damaged in any way. If necessary, replace. Check for correct fitting.
If the version has a guide sleeve (5), check it for damage and to make sure it is correctly seated.

SB 3308

Ability of the caliper to slide to the full extent of the guide bearings:

Remove the brake pads. Fully retract the tappet (7) by turning the adjuster in an anti-clockwise direction, using an adapter.
It must be possible to slide the brake caliper (6) by hand over the entire distance of more than 20 mm on the guide pieces (8) and (9) as well as (10) and (11), without using any tools.

Check caliper guide seals:
The guide bushes (8) and (10) are sealed by means of the bellows pieces (12) and (13). These parts must not show any cracks or damage. Check that everything is properly seated.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

Check the caliper
- ECO Plus 2 and ECOPlus axles, when used within Europe, at every brake pad change or every year at the latest; every six months outside Europe –
- ECO axles and axles with conventional mounting, every six months –

If damage to the parts becomes visible on the thrust tappet when the bellows are checked, both bellows must be dismantled. The parts which have been removed must be replaced by new ones.

Before the new parts are fitted, check that the adjusting unit is free of corrosion and operates smoothly.

To check the parts, turn the threaded tubes (1) (SB 3308 a threaded pipe) on the hexagon nut (size 8 or size 10 with an adapter) of the adjuster clockwise onto the brake disc (2).

The threads of the threaded tubes (1) can be checked during the turning process for corrosion damage.

If the threads are rusted, the brake caliper must be replaced.

Note: Penetrating dirt and moisture cause corrosion and affect the operation of the clamping mechanism and adjustment.

If water has penetrated or rusting has been detected, replace the brake caliper.

Bellows at the thrust pieces
- ECO Plus 2 and ECOPlus axles, when used within Europe, at every brake pad change or every year at the latest; every six months outside Europe –
- ECO axles and axles with conventional mounting, every six months –

Prevent the vehicle from rolling away. Release the service brakes and the handbrake.

Remove the brake pads, if necessary.

The service brake and the spring-loaded parking brake must be in the released state.

Use the adjuster to extend the tappet, SB 3745 / SB 4309 / SB 4345 max. 30 mm, SB 3308 max. 40 mm, until the bellows seal is clearly visible.

The bellows on the tappets (arrow) must have no splits or damage.

Check for correct fitting.

Note: Penetrating dirt and moisture cause corrosion and affect the operation of the clamping mechanism and adjustment.

If water has penetrated or rusting has been detected, replace the brake caliper.
3 BPW Trailer axles / BPW Steering axles

3.2 Maintenance Work and Visual Inspection

3.2.4 Disc brakes, brake types: SB 3308, SB 3745, SB 4309, SB 4345

8 Check wheel hub bearing play
- ECO Plus 2 and ECO™ Unit at every brake pad change, however at least once a year –
- ECO Unit and conventional hub bearing every six months –

To check the wheel hub bearing play, raise the axle until the tyres are free. Release brake. Position lever between tyre and ground, and check play.

If you can feel play in the bearing, adjust the bearing play as described on pages 34 - 38.

9 Check caps for tightness
(not necessary with ECO Plus 2 and ECO™ axles)
- every 6 months and/ or as part of any other service inspection –

Check caps for tightness using a torque wrench or power tool.

Tightening torques:
Steel cap 5.5 t M = 500 Nm
6 - 12 t M = 800 Nm
Alloy cap M = 350 Nm

In an emergency the caps can be tightened using a normal cap spanner (vehicle tool kit) by striking the latter with a hammer, or also with the aid of a piece of tubing, inserted into the spanner.

Caps with integrated hubodometers must be fitted and dismantled using only torque controlled (do not use air impact wrenches) airguns or manually with a torque wrench.

Tighten to the correct tightening torque as soon as possible.

Note:
Caps on ECO Plus 2 axles are provided with a bayonet fitting. Check for firm seating.

Position 1: Hub cap seated loosely on the Unit.
Position 2: Hub cap seated firmly on the Unit.
## 4 BPW Air suspension, series EAC

### 4.1 Overview, Lubrication and Maintenance Work, Visual Inspection

| Visual checks during the warranty period for chassis fitted with ECO Plus air suspension after 12, 36, 60 and 72 months, subsequently yearly |

<table>
<thead>
<tr>
<th>Step</th>
<th>Task Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check air suspension levelling valve for condition, seal-tightness and general tightness.</td>
</tr>
<tr>
<td>2</td>
<td>Check condition of air bags.</td>
</tr>
<tr>
<td>3</td>
<td>Visual inspection, check all component parts and welding seams for damage and wear.</td>
</tr>
</tbody>
</table>
| 4    | Check shock absorber fastening for tightness.  
Tightening torque with a torque wrench:  
M 24 (SW 36)  \( M = 420 \text{ Nm} \) (390 - 460 Nm) |
| 5    | Check spring pivot bolts for tightness.  
Tightening torque with a torque wrench:  
M 24 (SW 36)  \( M = 650 \text{ Nm} \) (605 - 715 Nm) |
| 6    | Check axle clamping for tightness.  
Tightening torque with a torque wrench:  
M 20 (SW 30)  \( M = 420 \text{ Nm} \) |
| 7    | Check the spring bolt to gusset plate connecting bolt for tightness.  
Tightening torques with a torque wrench:  
M 18 x 1.5 (SW 27)  \( M = 420 \text{ Nm} \) (390 - 460 Nm)  
M 12 (SW 17)  \( M = 66 \text{ Nm} \)  
M 16 (SW 22)  \( M = 230 - 300 \text{ Nm} \)  
Centre screw  \( M = 300 \text{ Nm} \)  
Cylinder cap screw  \( M = 50 \text{ Nm} \) |
| 8    | Check axle lift for tightness.  
Tightening torques with a torque wrench:  
Supporting arm  \( M = 350 \text{ Nm} \) (325 - 385 Nm)  
Diaphragm cylinder  \( M = 190 \text{ Nm} \) (180 - 210 Nm)  
Hexagon screw  \( M = 75 \text{ Nm} \)  
Lock nut  \( M = 38 \text{ Nm} \)  
Cylinder cap screw  \( M = 50 \text{ Nm} \) |

Note: Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.
4 BPW Air suspension, series EAC

4.2 Maintenance Work and Visual Inspection

1 Air installation circuit
   – Service intervals as shown on page 64 –

Check air installation valves and line connections for firm seating, damage and seal tightness. Check valve linkage and fastenings (arrows) for damage and tightness.

The length of the valve lever and permissible angular positions for the valve linkage are shown in the illustration below.

2 Air bags
   – Service intervals as shown on page 64 –

Check air bags for external damage (surface cracking, abrasion, crease formation, trapped foreign bodies etc.). Replace air bags in the event of damage.

Safety notice
No welding should be carried out on steel parts of air bags and pressure vessel!

The air suspension should only be filled with compressed air when mounted. Danger of injury!

3 Visual inspection
   – Service intervals as shown on page 64 –

Check all component parts and welding seams for wear and damage.

3 Shock absorber fastening
   – Service intervals as shown on page 64 –

Check lower and upper shock absorber fastening for tightness.

Check condition and wear of the rubber bush and replace where appropriate.

Check shock absorbers for oil leakage. In cases of distinct traces of oil, the shock absorber must be replaced. A light mist of oil is acceptable!

Tightening torques with a torque wrench:
M 24 (SW 36) M = 420 Nm (390 - 460 Nm)
4 BPW Air suspension, series EAC

4.2 Maintenance Work and Visual Inspection

4 Spring pivot bolts
– Service intervals as shown on page 64 –

Check bushes; move vehicle back and forth slightly with brakes applied or move spring eyes with assembly lever with brakes released. No play should be present in the rolled spring end when doing so. If the fastening is loose the spring pivot bolt may be damaged.
- Check the lateral wear washers in the hanger bracket.
- Check the M 24 lock nut on the spring pivot bolt for tightness.

Tightening torque with a torque wrench:
M 24 (SW 36)  M = 650 Nm (605 - 715 Nm)

The life expectancy of the bearing depends on the tightness of the spring bolt or the inner bush.

5 Axle clamping
– Service intervals as shown on page 64 –

Check lock nuts of spring U-bolts for tightness. If loose, tighten nuts alternately a little at a time.

Tightening torques with a torque wrench:
M 20 (SW 30)  M = 420 Nm

When mounting new spring mounting kit components, tighten the M 20 locknuts to a tightening torque of:  M = 420 Nm + 90° angle tightening.

Note: Do not weld on the trailing arms and the bellows support!

6 Bolted connection, gusset plate spring bolts
– Service intervals as shown on page 64 –

Check the mounting bolts of the gusset plates on the spring bolts are firmly tightened, and retighten with a torque wrench if necessary.

Tightening torque:
M 18 (SW 27)  M = 420 Nm (390 - 460 Nm)

Installing or renewing the spring bolt:
1. Unscrew or install the spring bolt.
2. Loosely pre-mount the gusset plate with at least three M 16 bolts at the top on the crossmember and one M 18 bolt at the bottom on the spring bolt and tighten further until contact is made.
3. Set the track.
4. Tighten the spring bolt to the prescribed tightening torque.
5. Tighten the connecting bolt on the gusset plates spring bolt and then tighten the upper connecting bolt to the prescribed tightening torques.

7 Air bag fastenings
– Service intervals as shown on page 64 –

Check air bag fixing bolts or nuts for tightness. If necessary, retighten.

Tightening torques with a torque wrench:
M 12 (SW 17)  M = 66 Nm
M 16 (SW 22)  M = 200 - 230 Nm

Lower attachment - centre screw:
M 16 (SW 22)  M = 300 Nm
4  BPW Air suspension, series EAC

4.2  Maintenance Work and Visual Inspection

8  Axle lift
– Service intervals as shown on page 64 –

Sidewise mounted axle lift:
Check for tight fitting of the M 20 lock nut of the roller mounting on the lifting arm, if necessary tighten with a torque wrench.
Tightening torque:  
M 20 (SW 30) M = 350 Nm (325 - 385 Nm)

Two-sided lift:

a) Check the M 16 lock nuts on the diaphragm cylinder to make sure they are tight. Tighten with a torque wrench if necessary.
Tightening torque:  
M 16 (SW 24) M = 190 Nm (180 - 210 Nm)

b) Check for tight seating of the bump stop fixing screws on the trailing arms.
Tightening torque:  
M 10 (SW 8) M = 50 Nm

c) Check for tight seating of the bracket fixing screws on the shaped plate.
Tightening torque:  
M 12 (SW 17) M = 75 Nm

d) Check for the correct seating of the bolt circlip on the rear attachment support of the air suspension hanger brackets.
For versions from 2016, check for tight seating of lock nut.
M 10 (SW 16) M = 38 Nm

Air suspension

Spring pivot bolt bearing with axle lift

Side mounted axle lift

Two-sided lift

Support

Locking disc until 2015

Lock nut from 2016

Shaped plate

Bolt

Shaped part

Lever

Tube

Bush

Adjusting plate with anti-rotation device

Spring bolt
5 BPW Air suspension, series O, SL, AL

5.1 Overview, Lubrication and Maintenance Work, Visual Inspection

| Overview | For detailed description, see pages 76 - 84
| Air suspension series EAC see pages 64 - 71
| Suspension, see pages 86 - 95

| 1 | Grease stabilizer bearing bushes with BPW special longlife grease ECO-Li plus and check for wear.
| 2 | Visual inspection, check all component parts and welding seams for damage and wear.
| 3 | Check strap: Check condition and fastening.
| 4 | Check air suspension levelling valve for condition, seal-tightness and general tightness.
| 5 | Check condition of air bags.
| 6 | Check shock absorber fastening for tightness.
| 1) | Tightening torque with a torque wrench:
| M 20 (SW 30) | M = 320 Nm (300 - 350 Nm)
| M 24 (SW 36) | M = 420 Nm (390 - 460 Nm)
| For aluminium hanger brackets:
| M 24 (SW 36) | M = 320 Nm (300 - 350 Nm)

| 2) | Check spring pivot bolts for tightness.
| Tightening torque with a torque wrench:
| Hanger brackets and channel crossmember Airlight II from 09/2007:
| M 24 (SW 36) | M = 650 Nm (605 - 715 Nm)
| Hanger brackets from 8/2001:
| M 30 (SW 46) | M = 900 Nm (840 - 990 Nm)
| Hanger brackets up to 7/2001:
| M 30 (SW 46) | M = 750 Nm (700 - 825 Nm)
| Channel crossmember:
| M 30 (SW 46) | M = 900 Nm (840 - 990 Nm)

| 3) | Check spring mounting kit for tightness.
| Tightening torque with a torque wrench:
| M 20 (SW 30) | M = 340 Nm (315 - 375 Nm)
| M 22 (SW 32) | M = 550 Nm (510 - 605 Nm)
| M 24 (SW 36) | M = 650 Nm (605 - 715 Nm)
| When mounting new spring mounting kits for Airlight II:
| M 22 (SW 32) | M = 550 Nm + 90° angle tightening

1) ECO Plus Units with Airlight II and Airlight Direct air suspension are maintenance-free in On-Road applications and do not need to be retightened (see warranty documents ECO Plus).
2) Under extreme conditions, with more frequency.
3) Check twice annually.
# BPW Air suspension, series O, SL, AL

## 5.1 Overview, Lubrication and Maintenance Work, Visual Inspection

### Overview

For detailed description, see pages 76 - 84

Air suspension series EAC see pages 64 - 71

Suspension, see pages 86 - 95

Within 2 weeks of first journey under load,

1. Visual check during the warranty period for chassis fitted with ECO Plus air suspension after 12, 36, 60 and 72 months.
2. Check the bolt connection between the air suspension hanger bracket and the longitudinal member for tightness.

**Tightening torques with a torque wrench:**

- M 16: M = 260 Nm (240 - 285 Nm)

### 7

Tighten the spring bolt to gusset plate connecting bolt.

**Tightening torques with a torque wrench:**

- M 16 x 1.5 (SW 27): M = 420 Nm (390 - 460 Nm)

### 8

Check axle lift for tightness.

**Tightening torques with a torque wrench:**

- Cylinder: M 20 (SW 30): M = 350 - 380 Nm
- Supporting arm: M 16 (SW 24): M = 180 - 210 Nm
- Hexagon screw: M 12 (SW 17): M = 75 Nm

### 9

Check air bag fastening for tightness.

**Tightening torques with a torque wrench:**

- M 12 (SW 17): M = 66 Nm
- M 16 (SW 22): M = 230 - 300 Nm
- Lower attachment - centre screw: M 16 (SW 22): M = 300 Nm

### 10

Check stabilizer fastenings.

**Tightening torques with a torque wrench:**

- M 10 (SW 17): M = 53 Nm
- M 30 (SW 46): M = 750 Nm (700 - 825 Nm)

---

1) ECO Plus Units with Airlight II and Airlight Direct air suspension are maintenance-free in On-Road applications and do not need to be retightened (see warranty documents ECO Plus).

2) Under extreme conditions, with more frequency.

Note: Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.
5 BPW Air suspension, series O, SL, AL

5.2 Lubrication

5.3 Maintenance Work and Visual Inspection

1 Stabilizer bearing bushes
   – Service intervals as shown on page 72 –

   Grease stabilizer bearing bushes with BPW special longlife grease ECO-L™ and check for wear.

2 Air installation circuit
   – Service intervals as shown on page 72 –

   Check air installation valves and line connections for firm seating, damage and seal tightness.
   Check valve linkage and fastenings (arrows) for damage and tightness.

   The length of the valve lever and permissible angular positions for the valve linkage are shown in the illustration below.

1 Visual inspection
   – Service intervals as shown on page 72 –

   Check all component parts and welding seams for wear and damage.

1 Check straps
   – Service intervals as shown on page 72 –

   Examine check straps and attachment. Replace if necessary.
5 BPW Air suspension, series O, SL, AL
5.3 Maintenance Work and Visual Inspection

3 Air bags
- Service intervals as shown on page 72 –

Check air bags for external damage (surface cracking, abrasion, crease formation, trapped foreign bodies etc.). Replace air bags in the event of damage.

Safety notice
No welding should be carried out on steel parts of air bags and pressure vessel!
The air suspension should only be filled with compressed air when mounted. Danger of injury!

3 Shock absorber fastening
- Service intervals as shown on page 72 –

Check lower and upper shock absorber fastening for tightness. Tightening torques with a torque wrench.
Check condition and wear of the rubber bush and replace where appropriate.
Check shock absorbers for oil leakage. In cases of distinct traces of oil, the shock absorber must be replaced. A light mist of oil is acceptable!

Tightening torque:
M 20 (SW 30)  \( M = 320 \text{ Nm} \) (300 - 350 Nm)
M 24 (SW 36)  \( M = 420 \text{ Nm} \) (390 - 460 Nm)
In the case of alloy hanger brackets:
M 24 (SW 36)  \( M = 320 \text{ Nm} \) (300 - 350 Nm)

5 Spring pivot bolts
- Service intervals as shown on page 72 –

Check bushes, move vehicle back and forth slightly with the brake applied, or move rolled spring ends with the aid of a lever. No play should be present in the rolled spring end when doing so. If the fastening is loose the spring pivot bolt may be damaged.

- Check the lateral wear washers in the hanger bracket.
- Check the M 24 or M 30 lock nut on the spring pivot bolt for tightness.

Tightening torque with a torque wrench:
Air suspension hanger brackets and channel crossmember from 09/2007:
M 24 (SW 36)  \( M = 650 \text{ Nm} \) (605 - 715 Nm)
Hanger brackets from 08/2001:
M 30 (SW 46)  \( M = 900 \text{ Nm} \) (840 - 990 Nm)
Hanger brackets up to 07/2001:
M 30 (SW 46)  \( M = 750 \text{ Nm} \) (700 - 825 Nm)
Channel crossmember:
M 30 (SW 46)  \( M = 900 \text{ Nm} \) (840 - 990 Nm)

The serviceable life of the rubber / steel bush is dependent on the tightness of the inner steel bushing,
5  BPW Air suspension, series O, SL, AL

5.3  Maintenance Work and Visual Inspection

Spring mounting kit
– Service intervals as shown on page 72 –

Check lock nuts of spring U-bolts for tightness. If loose, tighten nuts alternately a little at a time.

 Tightening torques with a torque wrench:
M 20 (SW 30)  M = 340 Nm (315 - 375 Nm)
M 22 (SW 32)  M = 550 Nm (510 - 605 Nm)
M 24 (SW 36)  M = 650 Nm (605 - 715 Nm)

When mounting new spring mounting kit components for Airlight II, tighten the M 22 locknuts to a tightening torque of:
M = 550 Nm + 90° angle tightening.

Note: No welding should be performed on the trailing arm spring!

Bolted connection, gusset plate spring bolts
– Service intervals as shown on page 74 –

Check the mounting bolts of the gusset plates on the spring bolts are firmly tightened, and retighten with a torque wrench if necessary.

 Tightening torque:
M 18 x 1.5 (SW 27)  M = 420 Nm (390 - 460 Nm)

Installing or renewing the spring bolt:
1. Unscrew or install the spring bolt.
2. Loosely pre-mount the gusset plate with at least three M 16 bolts at the top on the cross-member and one M 18 bolt at the bottom on the spring bolt and tighten further until contact is made.
3. Set the track.
4. Tighten the spring bolt to the prescribed tightening torque.
5. Tighten the connecting bolt on the gusset plates spring bolt and then tighten the upper connecting bolt to the prescribed tightening torques.

Bolted connection, air suspension hanger bracket to longitudinal chassis beam
– Service intervals as shown on page 74 –

Check that the mounting bolts of the air suspension hanger bracket on the longitudinal member are firmly tightened. Tighten with a torque wrench if necessary.

 Tightening torque:
M 16  M = 260 Nm (240 - 285 Nm)
5 BPW Air suspension, series O, SL, AL

5.3 Maintenance Work and Visual Inspection

9 Axle lift
   – Service intervals as shown on page 74 –

Single-sided lift
   Check the M16 lock nuts on the lever arm fixing to make sure they are tight. Tighten with a torque wrench if necessary.

   Tightening torque:
   M 16 (SW 22)  \( M = 230 \) Nm

   Check for wear on the bump stop on the lever arm. Make sure it is secure.

   Tightening torque:
   M 10 (SW 17)  \( M = 25 \) Nm
   M 12 (SW 17)  \( M = 66 \) Nm

Two-sided lift:

   a) Check the M16 lock nuts on the diaphragm cylinder to make sure they are tight. Tighten with a torque wrench if necessary.

   Tightening torque:
   M 20 (SW 30)  \( M = 350 - 380 \) Nm
   M 16 (SW 24)  \( M = 180 - 210 \) Nm

   b) Check the bump stop on the lever arm for wear, and that the M 6 attachment bolts are firmly tightened.

   c) Check that the attachment bolts of the front bracing strut of the mount on the air suspension hanger bracket are tight, and in the case of the bolt-on two-sided lift, the bolted connection on the air suspension hanger bracket.

   Tightening torque:
   M 12 (SW 17)  \( M = 75 \) Nm

Spring pivot bolt bearing with axle lift

Single-sided lift

Two-sided lift

Bolt-on double-sided lift

Bolt-on two-sided lift

- Service intervals as shown on page 74 –

9 Axle lift

Single-sided lift

Check the M16 lock nuts on the lever arm fixing to make sure they are tight. Tighten with a torque wrench if necessary.

Tightening torque:
M 16 (SW 22)  $ M = 230 \text{ Nm}$

Check for wear on the bump stop on the lever arm. Make sure it is secure.

Tightening torque:
M 10 (SW 17)  $ M = 25 \text{ Nm}$
M 12 (SW 17)  $ M = 66 \text{ Nm}$

Two-sided lift:

a) Check the M 16 lock nuts on the diaphragm cylinder to make sure they are tight. Tighten with a torque wrench if necessary.

Tightening torque:
M 20 (SW 30)  $ M = 350 - 380 \text{ Nm}$
M 16 (SW 24)  $ M = 180 - 210 \text{ Nm}$

b) Check the bump stop on the lever arm for wear, and that the M 6 attachment bolts are firmly tightened.

c) Check that the attachment bolts of the front bracing strut of the mount on the air suspension hanger bracket are tight, and in the case of the bolt-on two-sided lift, the bolted connection on the air suspension hanger bracket.

Tightening torque:
M 12 (SW 17)  $ M = 75 \text{ Nm}$
5  BPW Air suspension, series O, SL, AL

5.3  Maintenance Work and Visual Inspection

10  Air bag fastenings
– Service intervals as shown on page 74 –

Check air bag fixing bolts or nuts for tightness.
If necessary retighten using torque wrench.

   Tightening torques with a torque wrench:
   M 12 (SW 17)    M = 66 Nm
   M 16 (SW 22)    M = 230 - 300 Nm

   Lower attachment - centre screw
   M 16 (SW 22)    M = 300 Nm

11  Stabilizer
– Service intervals as shown on page 74 –

Check stabilizer bearings for wear and tightness.

   Tightening torques with a torque wrench:
   M 10 (SW 17)    M = 53 Nm
   M 30 (SW 46)    M = 750 Nm (700 - 825 Nm)
6  BPW Suspension, series ECO Cargo VB

6.1  Overview, Lubrication and Maintenance Work, Visual Inspection

### Overview

For detailed descriptions, see pages 88 - 91
For BPW trailer axles / steering axles, see pages 6 - 62

<table>
<thead>
<tr>
<th></th>
<th>Initially after 2 weeks</th>
<th>Every 6 weeks</th>
<th>Every 26 weeks + (twice annually)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grease bearings (suspension type E) with BPW special longlife grease ECO-Li&lt;sup&gt;++&lt;/sup&gt;. (Not applicable in the case of rubber/steel bushes.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Slightly grease the slide elements/slide ends of springs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Check threaded bolts on equaliser arm bearings for tightness. up to an axle load of 5.5 tonnes (from 03/2016) M 30 (SW 46)  M = 725 Nm up to an axle load of 12 tonnes (from 08/2013) M 42 x 3 (SW 65)  M = 1300 Nm up to an axle load of 12 tonnes (up to 07/2013) M 42 x 3 (SW 65)  M = 1100 Nm Series HD / HDE M 48 x 3 (SW 65)  M = 1200 - 1300 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Check axle connecting rod bolts for tightness using a torque wrench. M 24 x 2 (SW 36)  M = 650 Nm M 30 (SW 46)  M = 725 Nm M 36 (SW 55)  M = 1425 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Check connecting rod clamping bolts for tightness. M 12 (SW 19)  M = 66 Nm M 14 (SW 22)  M = 140 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Check spring U-bolts for tightness using a torque wrench. M 20 (SW 30)  M = 315 - 375 Nm M 24 (SW 36)  M = 600 - 650 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Visual inspection, check all component parts and welding seams for wear and damage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Check spring pivot bolts for tightness. (Serie up to 5.5 t) M 20 (SW 30)  M = 340 Nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Check slide elements and rollers for tightness. M 14 (SW 22)  M = 140 Nm M 16 (SW 24)  M = 163 Nm M 20 (SW 30)  M = 320 Nm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Under extreme conditions, with more frequency.

Note: Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.
6 BPW Suspension, series ECO Cargo VB

6.2 Lubrication

1 Equalizer arm bearings with bronze bushes (Series ECO Cargo VB ME and ECO Cargo VB HDE) – initially after 2 weeks then every 6 weeks – – under extreme conditions, lubricate with more frequency – Lift trailer to take pressure off equalizer arm bearings.

Grease bronze bush bearing via the grease nipple in the heads of the threaded bolts with BPW special longlife grease ECO-Li plus until fresh grease emerges. (Not applicable to rubber/steel bushes.)

At extremely low temperatures (-30° C to -50° C) a grease with correspondingly lower consistency class should be used - such as BPW ECO-Li Polar.

2 Slide elements – initially after 2 weeks then every 6 weeks – – under extreme conditions, lubricate with more frequency –

Clean and lightly grease the slides / slide ends of the springs.

In the case of ECO Cargo VB suspensions (up to 07/2013) with anti-vibration leaf underneath the parabolic springs, grease the lower slide elements via the grease nipples (arrow).

1 Equalizer arm bearings

– twice annually –

Check nuts on the equalizer arm bearings for tightness. The serviceable life of the rubber/steel bush bearings is dependent on the tightness of the inner steel bush.

Tightening torques:
- up to an axle load of 5.5 tonnes (from 03/2016)
  - M 30 (SW 46) M = 725 Nm
- up to an axle load of 12 tonnes (from 08/2013)
  - M 42 x 3 (SW 65) M = 1300 Nm
- up to an axle load of 12 tonnes (up to 07/2013)
  - M 42 x 3 (SW 65) M = 1100 Nm

Series HD / HDE
- M 48 x 3 (SW 65) M = 1200 - 1300 Nm

2 Axle guide linkages

– twice annually, initially after 2 weeks –

Check lock nuts of the axle guide linkages/connecting rods for tightness using a torque wrench.

Tightening torques:
- M 24 x 2 (SW 36) M = 650 Nm
- M 30 (SW 46) M = 725 Nm
- M 36 (SW 65) M = 1425 Nm

3 Connecting rods (only at series VB up to manufacturing year 08.2013 and ECO Cargo VB HD) – twice annually –

Check connecting rod clamping screws for tightness.

Tightening torques:
- M 12 (SW 19) M = 66 Nm
- M 14 (SW 22) M = 140 Nm

2 Axle guide linkages

– twice annually, initially after 2 weeks –

Check lock nuts of the axle guide linkages/connecting rods for tightness using a torque wrench.

Tightening torques:
- M 24 x 2 (SW 36) M = 650 Nm
- M 30 (SW 46) M = 725 Nm
- M 36 (SW 65) M = 1425 Nm

3 Connecting rods (only at series VB up to manufacturing year 08.2013 and ECO Cargo VB HD) – twice annually –

Check connecting rod clamping screws for tightness.

Tightening torques:
- M 12 (SW 19) M = 66 Nm
- M 14 (SW 22) M = 140 Nm
6  BPW Suspension, series ECO Cargo VB

6.3  Maintenance Work and Visual Inspection

**Spring U-bolts**
- Initially after 2 weeks then twice annually –

Check spring U-bolts for tightness. If necessary loosen lock nuts, tighten nuts alternately to the prescribed torque, and a bit at a time, if necessary then re-lock.

Tightening torques:
- M 20 (SW 30)  M = 315 - 375 Nm
- M 24 (SW 36)  M = 600 - 650 Nm

**Visual inspection**
- Twice annually –

Check all component parts and welding seams for wear and damage.

In order to check the bearing on the equalizer and axle guide linkage, move the vehicle back and forth slightly with the brake applied; or move the bearing points with the aid of a lever. No play should be present in the bearing when doing so.

**Spring pivot bolts** (series ECO Cargo VB up to 5.5 t)
- Initially after 2 weeks then twice annually –

Check bushes; move the vehicle back and forth slightly with brakes applied or move spring eyes with assembly lever with brakes released. No play should be present in the rolled spring end when doing so. If the fastening is loose the spring pivot bolt may be damaged.

Check the M 20 lock nut on the spring pivot bolt for tightness.

Tightening torque with a torque wrench:
- M 20 (SW 30)  M = 340 Nm

The life expectancy of the bearing depends on the tightness of the spring bolt or the inner bush.

**Slide elements**
- Twice annually –

Check slide elements and lateral wear plates in the shackle and equalizer arm for wear and the fastening screws for tightness.

Tightening torques:
- M 14 (SW 22)  M = 140 Nm
- M 16 (SW 24)  M = 163 Nm
- M 20 (SW 30)  M = 320 Nm

If necessary, check rubber rollers under the spring ends for wear.
### Overview, Lubrication and Maintenance Work, Visual Inspection

For detailed description, see pages 94 - 95
BPW trailer axles / steering axles, see pages 6 - 62

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Initial</th>
<th>After</th>
<th>Every 6 weeks</th>
<th>Every 26 weeks</th>
<th>Twice annually</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Grease axle support bearing series W, BW using BPW special longlife grease ECO-LiPlus</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>2</td>
<td>Grease spring housing series W using BPW special longlife grease ECO-LiPlus</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>3</td>
<td>Visual inspection, check all component parts and welding seams for wear and damage</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>4</td>
<td>Check spring U-bolt of support axle for tightness</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>5</td>
<td>Check fastening screws on the bearing covers for tightness</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>6</td>
<td>Check spring U-bolts on the spring housing for tightness</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

1) Under extreme conditions, with more frequency.

Note:
Components that have damage due to improper mounting are to be exchanged after a review by a BPW Service Centre.

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**Series ECO Cargo W**

**Series ECO Cargo BW / GW**
7 BPW Suspension, series ECO Cargo W / BW / GW

7.2 Lubrication

1 Support axle (series W, BW)
   – initially after 2 weeks then every 6 weeks –
   – under extreme conditions, lubricate with more
     frequency –

   Lift trailer to take pressure off the trunnion bearings.
   Grease lubrication nipple front and rear on the
   bearing brackets of the support axle using BPW
   special longlife grease ECO-Li plus until fresh grease
   emerges (not applicable to axle assembly series
   GW = rubber bush).

   At extremely low temperatures (-30° C up to 50° C)
   a grease with correspondingly lower consistency
   class should be used - such as BPW ECO-Li Polar.

   ![Series ECO Cargo W](image)

2 Spring housing (series W)
   – initially after 2 weeks then every 6 weeks –
   Grease lubrication nipples on the spring housing
   using BPW special longlife grease ECO-Li plus.

   ![Series ECO Cargo BW](image)

   ![Series ECO Cargo W](image)

3 Spring U-bolts on the spring housings
   – twice annually, initially after 2 weeks –
   Check spring U-bolts for tightness.
   If necessary loosen lock nuts, tighten nuts alter-
   nately to the prescribed torque, a bit at a time, then
   relock.

   Tightening torques:
   M 30 x 2 (SW 46)  M =   980 Nm
   M 36 (SW 55)  M = 1555 Nm

   ![Series ECO Cargo W](image)

4 Fastening screws on the cover plates
   – twice annually –
   Check the fastening screws on the cover plates of
   the support axle for tightness.

   Tightening torques:
   M 20 (SW 30)  M = 320 Nm
   M 24 (SW 36)  M = 570 Nm

   ![Series ECO Cargo W](image)

5 Visual inspection
   – twice annually –
   Check all components and welding seams for wear
   and damage.

   ![Series ECO Cargo W](image)

6 Spring U-bolts on the trunnion axle
   – twice annually, initially after 2 weeks –
   Check spring U-bolts for tightness.
   If necessary loosen lock nuts, tighten nuts alter-
   nately to the prescribed torque, a bit at a time, then
   relock.

   Tightening torques:
   M 30 x 2 (SW 46)  M =   980 Nm
   M 36 (SW 55)  M = 1555 Nm

   ![Series ECO Cargo W](image)

7.3 Maintenance Work and Visual Inspection
BPW is a globally leading manufacturer of intelligent running gear systems for trailers and semi-trailers. As an international mobility and system partner, we offer a wide range of solutions for the transport industry from a single source, from axle to suspension and brake to user-friendly telematics applications.

We thereby ensure outstanding transparency in loading and transport processes and facilitate efficient fleet management. Today, the well-established brand represents an international corporation with a wide product and service portfolio for the commercial vehicle industry. Offering running gear systems, telematics, lighting systems, composite solutions and trailer superstructures, BPW is the right system partner for automotive manufacturers.

BPW, the owner-operated company, consistently pursues one target: To always give you exactly the solution which will pay off. To this end, we focus our attention on uncompromising quality for high reliability and service life, weight and time-saving concepts for low operating and maintenance costs as well as personal customer service and a close-knit service network for quick and direct support. You can be sure that with your international mobility partner BPW, you always use the most efficient method.

Your partner on the path to economic viability