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3. General instructions for correct assembly and disassembly
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5. Assembly hub assembly
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7. Assembly service brake
8. Assembly parking brake
Important remarks

For safety reasons, the operator should verify and service at regular intervals all of the bolted assemblies and all of the important safety locks such as:

- Wheel nuts

- Nuts of axle mounting bolts

- Bolts on the steering components and the brake system parts; if the screws are tightable, the Loctite contact breaks loose and remounting is necessary.

- Corrosion on the carrier elements (such as the axle spindle) is not acceptable for operational safety reasons.

- Verify seals, oil levels and lubrication at regular intervals.

Brakes

- Inspect brake lining and brake drum / brake disc regularly as well as wear of brake system parts.

- Inspect the free movement of brake system rods.

- In case of signs of excessive heating, consult a brake specialist or the manufacturer.
Instructions for ordering spare parts

We only accept liability for the original spare parts supplied by ourselves. We express clearly that the utilisation of other parts than the from us prescribed original spare parts, can change unfavourably the characteristics of the axle prescribed by the construction and that thereby the safety can be affected. For damage caused by the utilisation of not original spare parts and accessories, any liability of the Kessler & Co GmbH is excluded. Please bear in mind that special manufacturing and delivery specifications apply to own as well as to foreign parts and that we always offer spare parts to the up-dated technical conditions and the up-dated legal prescriptions.

When ordering Kessler spare parts, please furnish the following information:

1. Order number (installation drawing no.) → see identification plate
2. Fabrication number → see identification plate
3. Vehicle producer
4. Description of the spare part
5. Spare part number (drawing - resp. DIN no.)
6. Number of pieces
7. Kind of delivery

In case of doubt, consult Kessler & Co.

For major repairs or overhaul, it is recommendet that the complete axle assembly be returned to Kessler & Co.
Lubrication intervals and maintenance instructions
General lubrication instructions

Lubrication points  see sheet 2.2 resp. installation drawing.
Lubricants  see sheet 2.3
Fill levels  Are checked at the level control plugs.

Oil change
Place the vehicle in a horizontal position. Draining of the oil is to be accomplished only in warm condition. Clean all lubrication points before opening them. Open the drain holes on the carrier assembly, on the wheel assemblies, and if present, on the interaxle differential and drop gear housing. On the hub assemblies, the drain plug should be turned downward.

Oil draining
Replacement of the oil draining plugs.
Remove the oil filler plug as well as the oil level control plug on the carrier assembly, on the wheel assembly, and, if present, on the interaxle differential and drop gear housing. (See sheet 2.2 → lubrication points).

Oil filling
Check the oil level at the oil level plug hole (Overflow control). Wait a few minutes. If the oil level falls, add oil until the level remains constant.

Clean the grease nipples before lubrication.

Lubrication intervals  see sheet 2.3

Important!
On the axles with self locking differentials, a noise is produced if normal oils are used. In case of abnormal noises and in case of operation under bumpy conditions, use gear oil EP with additives of the "Limited Slip" type conforming to specification M 2C - 104 A.

In case of prolonged non-operation of the vehicle, it is recommended to start-up and operate all of the parts of the gear train every 6 months. For this purpose, maintain the proper oil level which also protects the axle against water intrusion.

The surfaces of the brake areas are to be preserved in humid locations. On start-up, a break-in of the braking system by intermittent operation is indispensable.
Lubrication points

The binding lubrication points have to be taken from the according installation drawing of the axle.

Single drive assembly

* The position is dependent from the respective axle version.

Drive assembly with throughdrive
Version with interaxle differential.
Fill 1,5 litre oil at I + II * for first - time filling and for refilling!

Drop gear D 51 / D 108

* II only at version with separately oil space.

Cardan shaft intermediate bearing

I = Oil fill plug
II = Oil level control plug
III = Oil drain plug
IV = Grease nipple
Hub assembly with planetary gear drive

Lubrication points at universal joint and brake shaft.
(If not maintenance - free)

Hub assembly with wet disc brake

Tumbler bearing

I = Oil fill plug
II = Oil level control plug
III = Oil drain plug
IV = Grease nipple
# Lubricants and lubrication intervals

<table>
<thead>
<tr>
<th>Lubrication point</th>
<th>Lubricant</th>
<th>Remarks</th>
<th>Lubrication intervals 1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive assembly</td>
<td>Hypoid – gear oil per MIL-L – 2105 B / API GL 5 Hypoid – gear oil in multi – range characteristic per MIL-L – 2105 C / D / API GL 5 SAE 90 or multi grade oils for normal external temperature SAE 75 W – 90; SAE 75 W – 85 for external temperature lower – 10°C SAE 140 or multi grade oils for external temperature over + 30°C</td>
<td>Oilchange</td>
<td>after 1000h, 1000km every 500h, 5000km every 1000h, 10000km min. tx in 2 years</td>
</tr>
<tr>
<td>Wheel hub planetary gear drive</td>
<td></td>
<td>Check oil level at control points monthly</td>
<td>+</td>
</tr>
<tr>
<td>Interaxle differential</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Drop gear/ Gear boxes</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Wheel bearing oil lubricated</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Multi disk parking brake</td>
<td>hydraulic oil / ISO VG 32</td>
<td>Oilchange wet running</td>
<td>+</td>
</tr>
<tr>
<td>Steering knuckle bearing</td>
<td>Multi – use grease lithium saponified groove penetration per NLGI 2</td>
<td>maintenance reduced</td>
<td>+</td>
</tr>
<tr>
<td>Steering knuckle bearing</td>
<td>f. e. Fuchs Renolit MP 150</td>
<td>if provided for</td>
<td>+</td>
</tr>
<tr>
<td>Universal joint</td>
<td></td>
<td>if provided for</td>
<td>+</td>
</tr>
<tr>
<td>Track rod</td>
<td></td>
<td>if provided for</td>
<td>+</td>
</tr>
<tr>
<td>Steering cylinder -ball head/ -spherical plain bearing</td>
<td></td>
<td>if provided for</td>
<td>+</td>
</tr>
<tr>
<td>Cardan shaft intermediate bearing</td>
<td></td>
<td>if provided for</td>
<td>+</td>
</tr>
<tr>
<td>pinion bearing</td>
<td></td>
<td>if grease lubricated</td>
<td>+</td>
</tr>
<tr>
<td>Brake shaft bearing</td>
<td></td>
<td>Attention! 2.)</td>
<td>+</td>
</tr>
<tr>
<td>Brake shoe bearing</td>
<td></td>
<td>Lightly greased at brake shoe new assembly</td>
<td>+</td>
</tr>
<tr>
<td>Wheel bearing</td>
<td></td>
<td>Change grease at wheel hub disassembly</td>
<td>+</td>
</tr>
<tr>
<td>Wet disc brake</td>
<td>see chapter -7-</td>
<td>external cooled oilchange</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>not external cooled oilchange</td>
<td>+</td>
</tr>
</tbody>
</table>

1.) Whichever occurs first.
2.) The bearing point is to be lightly lubricated only, to avoid the penetration of grease in the interior of the brake (use only hand operated grease gun and remove surplus grease!). Check regularly the brake shafts and if need correct the lubrication intervals (danger of overheating!)
Recomendable hypoid gear oils corresp.
MIL-L 2105 B/API GL 5 resp. MIL-L 2105 C/D/API GL 5

ARAL - Gearoil Hyp 90
AVIA - Gearoil Hypoid 90 EP
BP - Multiuse - Gearoil EP SAE 90
ELF - Traself Typ B 90 / Traself Typ B 80 W - 90
ESSO - Gearoil GX - D 90
FINA - Pontonic MP SAE 85 W - 90
FUCHS - Renogear Hypoid 90
MOBIL - HD 90 - A
SHELL - Spirax MB 90 / HD 90
TEXACO - Multigear EP SAE 85 W / 90
AGIP - Rotra MP / Rotra MP DB

On no account use “normal” gear oils!
<table>
<thead>
<tr>
<th>Check - and maintenance points</th>
<th>Remarks</th>
<th>Maintenance intervals 1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>after 500h 1000h 5000Km 10000Km</td>
</tr>
<tr>
<td>Wheel bearing</td>
<td>Inspect, if necessary readjust wheel bearing</td>
<td>☺</td>
</tr>
<tr>
<td>Wheel nuts</td>
<td>Check and tighten with a torque wrench (after tire change after 50km and 200km)</td>
<td>☺</td>
</tr>
<tr>
<td>Castle nuts/track rod Screws/drive flange Nuts/axle mounting bolts</td>
<td>Check and retighten (Verify the adjustment)</td>
<td>☺</td>
</tr>
<tr>
<td>Brakes (see also chapter 7)</td>
<td>Check lining wear, if necessary readjust, control the proper operation of the brake shafts</td>
<td>☺</td>
</tr>
<tr>
<td>NLB</td>
<td>Check lining wear</td>
<td>☺</td>
</tr>
<tr>
<td>NLB - spring load design</td>
<td>Check lining wear</td>
<td>☺</td>
</tr>
<tr>
<td>Steering - and trackrod lever</td>
<td>Check and retighten mounting bolts *)</td>
<td>☺</td>
</tr>
<tr>
<td>Bolted connections (f. e. drive assembly)</td>
<td>Check from time to time</td>
<td>☺</td>
</tr>
<tr>
<td>Ring gear support bolt on drive assembly</td>
<td>Readjust (if necessary)</td>
<td></td>
</tr>
<tr>
<td>Seals</td>
<td>Check from time to time</td>
<td></td>
</tr>
<tr>
<td>Differential lock</td>
<td>Check function and the automatic return in original position</td>
<td></td>
</tr>
</tbody>
</table>

(Bh = Hours of operation)

*) If the bolts are moving (Loctite brakes loose), the lever has to be mounted once more.

1.) Whichever occurs first.
• General assembly /disassembly instructions
• service tools
General instructions for correct assembly and disassembly

- The assembly is to be accomplished only by trained personnel.
- The disassembly can be made reverse to the respective assembly instruction.
- Drain oil before removing, check for presence of metal particles.
- Mark the parts to each other before dismantle.
- Never use a hard objet to separate tightly fitted assemblies. To remove bearings, drive flanges and similair parts, use the proper pullers.
- It is recommended that the special tools according 3.6 used for disassembly.
- Do not place parts on a dirty surface.
- Systematically replace used seals, O - rings and if need bearings on disassembly.
- Clean parts before reassembly.
- Replace or clean corroded parts.
- The cages of bearings rotating in oil are to be coated with oil at reassembly.
- Seal ring treads on flanges, shafts etc. must be preserved with Castrol Rustilo DWX 32 before mounting.
- Oil seal rings and particularly the anti - dust lip seals must be filled with grease.
- The universal joint shafts and the axle shafts must not be force mounted (they must slide).
- At mounting of radial seal rings pay attention that there is suffice overlap to the housing bores. Pay attention for a plain alignment of the radial seal ring. The seal lips always must not be contacted with Loctite!
- The bolted or keyed assemblies safeties are to be checked according to instructions; in case of doubt, consult Kessler & Co.
- Refill the oil after assembly!
- Repair weldment is only allowed after consultation with Kessler & Co!
## Using of Loctite and operating supplies

<table>
<thead>
<tr>
<th>Type</th>
<th>Colour</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. LOCTITE</td>
<td>243</td>
<td>blue Lightly locked screws</td>
</tr>
<tr>
<td></td>
<td>262</td>
<td>red Middle locked screws</td>
</tr>
<tr>
<td></td>
<td>270</td>
<td>green Highly locked screws</td>
</tr>
<tr>
<td></td>
<td>270</td>
<td>green Increased coefficient of friction in contact surfaces</td>
</tr>
<tr>
<td>510</td>
<td>orange</td>
<td>Surface gasket</td>
</tr>
<tr>
<td>572</td>
<td>white</td>
<td>Special gasket</td>
</tr>
<tr>
<td>638</td>
<td>light-green</td>
<td>Glueing with big width of slit</td>
</tr>
<tr>
<td>2. EPPLE</td>
<td>33</td>
<td>grey Surface gasket</td>
</tr>
<tr>
<td>3. DIRKO</td>
<td>grey</td>
<td>Elastic gasket</td>
</tr>
</tbody>
</table>

### Remarks for working up Loctite and operating supplies

- Threads and surfaces have to be cleaned and free from colour, oil and grease before applying Loctite.
- Loctite will harden under following conditions:
  - Exclusion of air
  - Metal contact
  - Increased temperature
- Pre-assembly and control tightening has to be made in a short time (5 to 10 min.).
- The time between glueing and mounting of the parts should be shorter than 1h. Exception: parts made from nonferrous metal have to be glued within one minute.
- Assembled parts must remain unloaded for at least 24 hours.
- **Loctite quantity**
  - at screws:
    1 bead
  - At contact surfaces:

Pay attention for a sufficient Loctite application
<table>
<thead>
<tr>
<th>Safety blocked parts</th>
<th>Joint</th>
<th>Loctite</th>
<th>Operating supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacer ring</td>
<td>Contact surface</td>
<td>572</td>
<td>-</td>
</tr>
<tr>
<td>Axle spindle</td>
<td>Screws</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Axle spindle</td>
<td>Contact surface</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Grommet</td>
<td>in planetary housing</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Disc</td>
<td>in axle spindle</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Adjusting screw with nut</td>
<td>in planetary housing</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Support</td>
<td>Screw</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Ring gear retainer</td>
<td>Screws</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Pol wheel</td>
<td>Contact surface</td>
<td>638</td>
<td>-</td>
</tr>
<tr>
<td>Steering lever Track rod lever</td>
<td>Screws</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Steering lever Track rod lever</td>
<td>Contact surface</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Wheel hub cover</td>
<td>Thread</td>
<td>572</td>
<td>-</td>
</tr>
<tr>
<td>Radial seal rings</td>
<td>Contact surface</td>
<td>572</td>
<td>-</td>
</tr>
<tr>
<td>Rubber casing</td>
<td>Contact surface</td>
<td>572</td>
<td>-</td>
</tr>
<tr>
<td>Radial seal rings</td>
<td>Contact surface</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Steel casing</td>
<td>Contact surface</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Wheel safety nut</td>
<td>see chapter 5</td>
<td></td>
<td>Adjustment of wheel bearings</td>
</tr>
</tbody>
</table>

**Note:**
- Indicates the use of Loctite as a sealing or fastening agent.
- Indicates the use of other operating supplies as specified.
## Use of Loctite and operating supplies

<table>
<thead>
<tr>
<th>Drive assembly</th>
<th>Joint</th>
<th>Loctite</th>
<th>Operating supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety blocked parts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive flange</td>
<td>Nut surface</td>
<td>-</td>
<td>Epple 33</td>
</tr>
<tr>
<td>Diff-housing</td>
<td>Screws</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Shifter cylinder (Diff-lock)</td>
<td>Contact surface</td>
<td>572</td>
<td>-</td>
</tr>
<tr>
<td>Diff.carrier (Through drive)</td>
<td>Contact surface</td>
<td>510</td>
<td>-</td>
</tr>
<tr>
<td>Drop gear housing</td>
<td>Contact surface</td>
<td>510</td>
<td>-</td>
</tr>
<tr>
<td>Diff.carrier</td>
<td>Contact surface</td>
<td></td>
<td>Epple 33</td>
</tr>
<tr>
<td>Through drive cover</td>
<td>Contact surface</td>
<td>510</td>
<td>-</td>
</tr>
<tr>
<td>Differential strap</td>
<td>Screws</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Adjustment nut screw</td>
<td>Screw</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Ring gear</td>
<td>Screws</td>
<td>262</td>
<td>-</td>
</tr>
<tr>
<td>Ring gear</td>
<td>Contact surface</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Ring gear support</td>
<td>Cap</td>
<td>270</td>
<td>-</td>
</tr>
<tr>
<td>Ring gear support</td>
<td>Thread</td>
<td>-</td>
<td>Epple 33</td>
</tr>
</tbody>
</table>
### Tightening torques (Nm)

\[ \mu = 0.14 \]

#### Metric standard thread

<table>
<thead>
<tr>
<th>Thread</th>
<th>Screw</th>
<th>Nut</th>
<th>Screw</th>
<th>Nut</th>
<th>Screw</th>
<th>Nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 4</td>
<td>3.0</td>
<td>4.4</td>
<td>5.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 5</td>
<td>5.9</td>
<td>8.7</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 6</td>
<td>10.0</td>
<td>15</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 8</td>
<td>25</td>
<td>36</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 10</td>
<td>49</td>
<td>72</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 12</td>
<td>85</td>
<td>125</td>
<td>145</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>M 14</td>
<td>135</td>
<td>200</td>
<td>235</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 16</td>
<td>210</td>
<td>310</td>
<td>365</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 18</td>
<td>300</td>
<td>430</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 20</td>
<td>425</td>
<td>610</td>
<td>710</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 22</td>
<td>580</td>
<td>830</td>
<td>970</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 24</td>
<td>730</td>
<td>1050</td>
<td>1220</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 27</td>
<td>1100</td>
<td>1550</td>
<td>1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 30</td>
<td>1450</td>
<td>2100</td>
<td>2450</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Metric fine pitch thread

<table>
<thead>
<tr>
<th>Thread</th>
<th>Screw</th>
<th>Nut</th>
<th>Screw</th>
<th>Nut</th>
<th>Screw</th>
<th>Nut</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 8 x 1</td>
<td>27</td>
<td>39</td>
<td>46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 10 x 1</td>
<td>55</td>
<td>81</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 10 x 1,25</td>
<td>52</td>
<td>76</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 12 x 1,25</td>
<td>93</td>
<td>135</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 12 x 1,5</td>
<td>89</td>
<td>130</td>
<td>155</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 14 x 1,5</td>
<td>145</td>
<td>215</td>
<td>255</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 16 x 1,5</td>
<td>225</td>
<td>330</td>
<td>390</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 18 x 1,5</td>
<td>340</td>
<td>485</td>
<td>570</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 20 x 1,5</td>
<td>475</td>
<td>680</td>
<td>790</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 22 x 1,5</td>
<td>650</td>
<td>920</td>
<td>1050</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Brake caliper dowel screws (greased!)

- M 20 x 1,5: 400 + 100
- M 27 x 2: 900 + 100

Nut for steering stop = 300 Nm

Regard reduced tightening torque for galvanized bolts and nuts!
# Tightening torques of wheel nuts

## Wheel nut with spring lock washer

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Phosphorous darkened</th>
<th>Galvanized</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 18 x 1,5</td>
<td>270 Nm</td>
<td>250 Nm</td>
</tr>
<tr>
<td>M 22 x 1,5</td>
<td>450 Nm</td>
<td>350 Nm</td>
</tr>
</tbody>
</table>

## Wheel nut with thrust collar

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Phosphorous darkened</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 22 x 1,5</td>
<td>650 Nm</td>
</tr>
</tbody>
</table>

## Wheel nut with clamp

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Galvanized</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 18 x 2</td>
<td>350 Nm</td>
</tr>
</tbody>
</table>
Tightening torques for castle nuts and adjusting nuts

Tightening torques for castle nuts on ball joints for track rods and ram cylinders

<table>
<thead>
<tr>
<th>Cone size d1 (mm)</th>
<th>Thread d2 (mm)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>M 20 x 1,5</td>
<td>200 - 220</td>
</tr>
<tr>
<td>30</td>
<td>M 24 x 1,5</td>
<td>280 - 300</td>
</tr>
<tr>
<td>32</td>
<td>M 27 x 1,5</td>
<td>290 - 320</td>
</tr>
<tr>
<td>38</td>
<td>M 30 x 1,5</td>
<td>340 - 360</td>
</tr>
<tr>
<td>45</td>
<td>M 39 x 1,5</td>
<td>410 - 430</td>
</tr>
</tbody>
</table>

The tightening torques of the different thread dimensions of the joints are applicable for nuts of quality S5.

Tightening torque of the adjusting nut resp. slotted nut at flanges resp. gearwheels etc.

<table>
<thead>
<tr>
<th>Thread d1 (mm)</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 24 x 1,5</td>
<td>360</td>
</tr>
<tr>
<td>M 30 x 1,5</td>
<td>450</td>
</tr>
<tr>
<td>M 36 x 1,5</td>
<td>540</td>
</tr>
<tr>
<td>M 42 x 1,5</td>
<td>850</td>
</tr>
<tr>
<td>M 45 x 1,5</td>
<td>850</td>
</tr>
<tr>
<td>M 48 x 1,5</td>
<td>850</td>
</tr>
<tr>
<td>M 52 x 1,5</td>
<td>950</td>
</tr>
<tr>
<td>M 64 x 1,5</td>
<td>1050 - 1100</td>
</tr>
</tbody>
</table>
When ordering service tools please provide order number (installation drawing no.), resp. fabrication number → see identification plate. (The illustrations are not binding for the design).

Spanner for wheel safety nut

Spanner for splined nut (hub assembly)
Service tools

Seal ring sleeve driver

Spanner for thread rings
(Differential bearing)

Spanner for counter nut
(Planetary gear drive)

Assembly cone for o-ring
(Differential lock)
Assembly sleeve for piston
(Differential lock)

Assembly sleeve for piston
(Differential lock)

Sleeve driver for universal joint bearing
(Needle bearing / bearing bushing)

Sleeve driver for bearing bushings
(Steering knuckle bearing)
Service tools

Puller for universal joint bearing
(needle bearing / bearing bushing)

Device to press in king pins

Hydraulic device to press in king pins
Mechanical puller for king pins

Hydraulic puller for king pins

Screw spindle for king pin pullers
Centering tool for discs

Installation tool for face seal
Adjustment of gear meshing of Gleason gears

It is only possible to achieve a perfect gear meshing, if the fabrication number of the drive pinion (marked on the end face) and the ring gear (marked on the circumference) are corresponding.

Perfect marking.

The following figures show improper gear meshing marks of the ring gear. The text alongside gives the corrections to obtain correct gear meshing. The dark colored arrows in the sketch of the drive pinion and ring gear indicate the direction towards which the drive pinion has to be moved. The clear arrows indicate the direction towards which the ring gear has to be moved, to get further more a correct backlash.

Gear meshing too deep.
Increase the drive pinion distance by correction of the adjustment disc thickness.
Regulate the backlash by inwards moving of the ring gear.

Gear meshing too high.
Decrease the drive pinion distance by correction of the adjustment disc thickness.
Regulate the backlash by outwards moving of the ring gear.
Securing of the striking nut

The brim of the striking nut has to be sheared only along the slot flank and the corner has to be bended on the slot ground.

Use of Loctite and other operating supplies

1. Striking nut at drive flange
   - In thread: assembly paste with MoS₂ (exception: through drive pinion see point 2).
   - Front side contact surface: sealing compound (Epple 33 or equivalent).

2. Striking nut at through drive pinion
   - In thread: Loctite 262.

3. Striking nut at gear wheels, bearings etc.
   - In thread: assembly paste with MoS₂.

Removing of the striking nut

Bend away the nose and screw the nut off.
Drive assembly D 51
Adjustment of drive pinion distance

To obtain the proper tooth flank contact, adjust the axial position of the drive pinion with the thickness of the adjustment disc. The necessary thickness of the adjustment disc for first time assembly can be obtained by measurement (see calculation example). The final thickness of the adjustment disc can be fixed during the checking of gear meshing at the assembled drive assembly (see page „Adjustment of gear meshing of Gleason gears“).

*) A = Set value for correct pinion support. This dimension is written on the end face of the pinion in millimetre. It indicates the deviation from the theoretic distance (setpoint dimension).

**) B = Measured width of the taper roller bearing.

**Calculation example to ascertain the thickness S from the adjustment disc:**

\[ A = +0,10; B = 37,95 \]

\[ S = 3,00 \text{ mm (theor.)} \]

\[ +0,05 \text{ mm} \rightarrow B = 0,05 \text{ mm smaller than } B \text{ theor.} \]

\[ = 3,05 \text{ mm} \]

\[ -0,10 \text{ mm} \rightarrow \text{ drive pinion value } A \]

\[ = 2,95 \text{ mm} \rightarrow \text{ necessary thickness of the adjustment disc} \]

Fit corresponding disc and outer rings of the taper roller bearings.

*) **Hint:** If value A is positive (e.g. +0,1) the adjustment disc has to be 0,1 mm thinner than theor. S. If value A is negative (e.g. –0,1) the adjustment disc has to be 0,1 mm thicker than theor. S.

**) **Hint:** If measure B is positive (e.g. 38,05) the adjustment disc has to be 0,05 mm thinner than theor. S. If measure B is negative (e.g. 37,95) the adjustment disc has to be 0,05 mm thicker than theor. S.
Assembly of drive pinion bearing

1. Insert the two outer rings of the taper roller bearings into the differential carrier.

2. Calculate the thickness C of the spacer ring.
   a. Place the two inner rings of the taper roller bearings in their outer rings. Measure A.
   b. Measure the dimension B of the drive pinion.
   c. Thickness of the spacer ring C = A - B.

3. Heat the drive pinion side taper roller bearing to about 100°C and install it on the drive pinion shaft. (Drive on completely after it cools).

4. Install the spacer ring on the pinion shaft.

5. Install the drive pinion into the differential carrier. Heat the taper roller bearing inner ring at undersize to about 100°C and install it with a tube onto the drive pinion shaft.

6. Install the drive flange onto the drive pinion shaft. Tighten the safety nut according sheet 3.5. For tightening fix the differential carrier and block the drive flange.

7. Measure the resistance of the bearings by using a torque wrench. If the measured value is not the prescribed 0.8 to 1.2 Nm, adjust the resistance by modification of the thickness of the spacer ring. After arriving at the adjustment of the bearing, back - off the safety nut and draw off the drive flange.

8. Install the radial seal ring with Loctite 572 applied. Fill the radial seal ring with bearing grease. Fit the carrier of the parking brake (if present) on the differential carrier and tighten the screws. Slip on the drive flange, screw on the safety nut with sealing compound between the contact surfaces. Tighten the safety nut according sheet 3.5. Lock the nut by striking the nut brim into the slot of the pinion.
Before assembly all of the bevel gears and the thrust rings should be well oiled.

1. Place one differential side gear with the side gear thrust washer in the differential case.

2. Install the spider with differential gears and differential pinion thrust washers in the differential case.

3. Install the other differential side gear and side gear thrust washer. (At variants with Nospin differential install the Nospin diff. instead of the differential gears)

4. Install the other half of the differential case over the assembly and observe the alignment marks, tighten the differential case bolts. Secure with Loctite 262.

5. Check that all differential pinions can rotate easily.

6. Coat the contact surface of the ring gear with Loctite 270 and install the ring gear on the differential case by tapping lightly on the circumference. Tighten the ring gear bolts. Secure with Loctite 262.

7. Heat the two taper roller bearings to about 100°C and install them by using a sleeve.
Assembly of drive assembly

Place the differential with the outer rings of the taper roller bearings on the differential carrier which is in a vertical position, with mounted drive pinion.

Mount the differential straps and align them with the thread rings.

During this operation be careful of the alignment marks on the differential straps with respect to the differential carrier. (Do not interchange the differential straps.)

Tighten the differential strap bolts by hand. By a counter rotation of the two thread rings, move the differential until the backlash is correct. (The smallest admissible value at the closest place is marked on the ring gear).

Therefore hold the drive pinion at the drive flange.
Check the backlash by careful forwards and rearwards rotating the ring gear. Use a dial indicator.

Measure the backlash during a few times turns of the ring gear and if need correct the backlash, because of the smallest admissible value at the closest place must not be fall short of.

Adjust gear meshing according to sheet "Adjustment of gear meshing of Gleason gears".

Tighten screws of the differential straps and lock them with Loctite 262.

Adjust the bearing roll resistance trough tightening of the thread rings. Set value: 2.0 to 3.0 Nm. Check the value with a torque wrench. If measuring at the drive pinion / drive flange, take the ratio of the bevel wheel set into account.

Screw the lock plates for the thread rings and secure with Loctite 270, if need bend the lock plates.
Hub assembly steer drive axle
Assembly bearing of steering knuckle and bearing of universal joint

Prepare the steering knuckle:

- Assembly of the spacer ring (if present) see sheet 5.1.6.

- Introduce the bearing bushing (4) into the lower bore of the steering knuckle and press in, by using a sleeve. Press in the upper bearing bushing (5), by using a sleeve, into the upper bore of the steering knuckle. (At version with spring support the upper bearing bushing (5) has to be mounted after installation of the king pin).

- Press the bearing (6) into the steering knuckle and secure it with the circlip (7). Install the seal rings (8) with Loctite 572 resp. 270, place the support disc (10) (if present) between the seal rings. Fill the seal rings with bearing grease.

Prepare the axle housing:

- Insert the inner circlip (7) into the axle housing. Press the bearing (6) into the axle housing and secure it with the second circlip (7). Install the seal rings (8) with Loctite 572 resp. 270, place the support disc (10) (if present) between the seal rings. Fill the seal rings with bearing grease.
Assembly of the drive assembly onto the axle housing

Coat the contact surface of the axle housing with Eppl 33 (at version through drive with Loctite 510), and mount the complete drive assembly. The axle housing being placed in a horizontal position, secure the screws with Loctite 262. Mount the pol wheel (if present) onto the universal joint (see 5.1.7).

Very carefully engage the long shaft of the universal joint into the axle housing.

The universal joint shaft should be able to be moved easily (by hand) in the toothing of the differential side gear.

At version with differential lock on the outside (D 71/ D 109) the differential lock must always be actuated when assemble or disassemble the universal joint.

Direction:

Actuating of the differential lock is necessary to prevent the sliding sleeve to drop out of the shifter fork into the axle housing when pulling out or sliding in the universal joint. This would entail disassembly of the axle.
Assembly of the steering knuckle onto the axle housing

At version with maintenance reduced steering knuckle bearing install the o-rings according to the respective version.

Fit the steering knuckle (1) onto the axle fork. **Caution:** Be very careful and do not damage the seal rings in the steering knuckle with the universal joint shaft!

Introduce the thrust discs (9) according the respective version.

Before mounting the king pins apply Molykote – powder or – paste on the pins and in the bores (danger of gripping).

Press in the king pins (11 + 12).

**Disassembly king pin:**

Draw off the lower king pin to the bottom, and the upper king pin to the top.
Important: threads and surfaces have to be cleaned and free from colour, oil and grease before applying Loctite. Note further remarks for working up Loctite (see sheet 3.2).

Coat the contact surface between lever (6 resp. 13) and steering knuckle at the contact area with Loctite 270 and install the lever by screws onto the steering knuckle, secure the screws with Loctite 262. Time needed for Loctite 270 to harden = 24 hours.

Coat the contact surface between cover (7 resp. 14) and steering knuckle with Loctite 510 and install the cover by screws onto the steering knuckle.

Screw the grease nipples into the lever resp. cover and grease the steering knuckle bearing with bearing grease according to the lubrication plan 2.3.

At version with dowel pins for increased torque, the dowel pins have to be knocked in before tightening the screws, note the position of the slits in the dowel pins (180° turned to one another).
Assembly of the hub assembly

- Assembly of the spacer ring (if present) see sheet 5.1.6.
- Install the brake onto the steering knuckle, be careful of the brake control position and bolt it. At version with disc brake install the brake carrier (if present), then mount the wheel hub with the brake disc, and after this operation install the brake.
- Prepare and mount the wheel hub see chapter 5.5.
  **Attention:** Hold the wheel hub with a hoist till the outer bearing with ring gear carrier is mounted.
- Assembly of the planetary gear drive see chapter 6.
- At version with drum brake mount the brake drum.
- Assembly of the ABS - sensor installation (if present) see 5.1.7.
Assembly of the spacer ring

Coat the seat of the spacer ring on the steering knuckle resp. axle spindle with Loctite 572. Heat the spacer ring to about 100°C and push it by gently striking onto the steering knuckle resp. axle spindle. (The steering knuckle resp. axle spindle must be free of corrosion). Oil the seal ring tread onto the spacer ring.
Prepare and mount wheel hub

Prepare wheel hub

Install the wheel studs (1).
Press in outer rings of taper roller bearings (2 + 3), do not hammer them.
Install inner ring of taper roller bearing (3).
Install the distance ring (4).
Press the radial seal rings (5) with Loctite 572 (rubber cage) resp. Loctite 270 (steel cage) applied into the wheel hub (6). Fill the radial seal rings with bearing grease.
Install the face seal (7) into the wheel hub (6) (see 5.8).

Mount wheel hub

Push the pre-assembled wheel hub (6) parallel onto the axle spindle resp. steering knuckle.

Attention: Be careful not to damage the radial seal rings (5).
Adjustment of wheel bearings

Tightening torque of the wheel safety nut

<table>
<thead>
<tr>
<th>series</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>300</td>
</tr>
<tr>
<td>51</td>
<td>350</td>
</tr>
<tr>
<td>61</td>
<td>400</td>
</tr>
<tr>
<td>71/72</td>
<td>400</td>
</tr>
<tr>
<td>81/82</td>
<td>450</td>
</tr>
<tr>
<td>91</td>
<td>500</td>
</tr>
<tr>
<td>109</td>
<td>500</td>
</tr>
<tr>
<td>116</td>
<td>500</td>
</tr>
<tr>
<td>L101</td>
<td>500</td>
</tr>
<tr>
<td>L102</td>
<td>550</td>
</tr>
<tr>
<td>D/LT 101/102</td>
<td>600-650</td>
</tr>
<tr>
<td>106</td>
<td>650-700</td>
</tr>
<tr>
<td>111</td>
<td>750</td>
</tr>
<tr>
<td>112</td>
<td>1000</td>
</tr>
</tbody>
</table>

Adjusting of wheel bearings

The temperature of the axle parts should be between 0 and + 20°C at the bearing adjustment.

Screw on the wheel safety nut (Loctite resp. Molykote- using see page 5.7.2) and adjust and secure as following described:

Screw on the wheel safety nut and tighten it with a 1,5 - 2 times higher tightening torque than the finish tightening torque. During the tightening, turn the wheel hub a few times and knock it with a plastic hammer. Untighten the wheel safety nut (about 180° back rotation), then tighten the wheel safety nut to the tightening torque according to the table. At this tightening turn the wheel hub also a few times, if there is no possibility for securing, the wheel safety nut has to be turned back to next securing possibility.
<table>
<thead>
<tr>
<th>Designation</th>
<th>Version</th>
<th>Security/ Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft nut with cheese head screw</td>
<td>Loctite 270</td>
<td>Cheese head screw &amp; Loctite 270</td>
</tr>
<tr>
<td></td>
<td>Molykote</td>
<td></td>
</tr>
<tr>
<td>Shaft nut with cheese head screw and bushing</td>
<td>Loctite 270</td>
<td>Cheese head screw &amp; Loctite 270</td>
</tr>
<tr>
<td></td>
<td>Molykote</td>
<td></td>
</tr>
<tr>
<td>Shaft nut with set screw</td>
<td>Loctite 262</td>
<td>Set screw &amp; Loctite 243/ 262 Back off set screw ½ rotation after tightening</td>
</tr>
<tr>
<td></td>
<td>Molykote</td>
<td></td>
</tr>
<tr>
<td>Shaft nut with counter nut</td>
<td>Loctite 243</td>
<td>Security spline &amp; counter nut &amp; Loctite 243</td>
</tr>
<tr>
<td></td>
<td>Molykote</td>
<td></td>
</tr>
</tbody>
</table>
Assembly of the face seal

Seal rings, torics, and housings must be clean and free of any oil film, dust, or other foreign matter. Use a solvent that evaporates quickly, leaves no residue, and is compatible with the rubber toric rings. The recommended solvent is Isopropanol. Ring and housings should be wiped with a solvent - soaked lint free cloth or paper towel.

After all components have been wiped clean, the torics should be installed on the metal seal rings so that they rest in the radius on the tail of the metal ring. Insure that the torics are not twisted by inspecting the mold flash line on the outside diameter of the toric for true circumferential tracking around the seal. Twisted torics will cause nonuniform face load that can result in leakage of lubricant and pumping of debris past the toric. If a twist is apparent, it can be eliminated by gently pulling a section of the toric radially away from the metal seal ring and letting it “snap” back. Repeating this in several places around the ring will eliminate any twist in the toric ring.

Put the toric ring (2) on seal ring (1), at the bottom of the seal ring ramp (7) and against the retaining lip (8). The toric ring (2) can twist if it is not wet all around during installation or if there are burrs of fins on the retaining lip (3) of the housing (5).

Eliminate toric twist by gently pulling a section of the toric (2) rapidly away from the seal ring (1) and letting it “snap” back.
Assembly of the face seal

Place the installation tool around the seal ring and dip the seal ring into a pan of Isopropanol solvent to lubricate the toric ring. It is essential to lubricate the toric with Isopropanol so that the toric will slip past the housing retaining lip and seal uniformly in the housing nose radius. Insufficient lubrication can cause poor seal performance due to nonuniform loading (twisted torics or cocked seals). Use of solvents other than Isopropanol can leave a residue on the toric or ramps and allow the toric to slide rather than roll in seat. This can also result in poor seal performance due to nonuniform loading.

Put the installation tool (9) onto the seal ring (1) with toric ring (2). Lower the rings into a container with Isopropanol until all surfaces of the toric (2) are wet.

Toric sliding on retainer ramp.

Toric caught on housing retainer lip.

Toric sliding on seal ramp.

After dipping the seal assembly in the solvent, shake the excess solvent from the seal assembly and immediately "pop" the seal into the housing with a firm push of the installation tool. Remove the installation tool and check the seal stantout height at several places around the circumference of the ring to verify an accurate installation. If the seal does not meet the height specification, inspect the toric for twists or obvious bulges.

With all surfaces of the toric ring (2) wet with Isopropanol, use the installation tool (9) to position the seal ring (1) and the toric ring (2) squarely against the housing (5) as shown. Use sudden and even pressure to pop (push) the toric ring (2) under the retaining lip (3) of the housing (5).
Assembly of the face seal

The seal can be adjusted by gently pushing the toric into position by hand or by using a fabricated adjustment hook.

If small adjustments are necessary, do not push directly on the seal ring (1); use the installation tool (9) to push down or the adjustment tool (11) to pull up.

A thin film of light oil should be applied to the seal faces prior to assembly. Use an applicator, a disposable tissue or a clean finger to distribute the oil evenly. Be careful not to get any oil on the rubber toric rings.

Be sure there is no visible debris on either of the seal faces - even a small piece of lint can hold the seal faces apart and cause leakage.

After successful installation, wait one minute for the Isopropanol to dry before assembling the two seal halves in the final loaded position. This delay is to allow any excess solvent to dry so that the torics roll, rather than slide, in the housing as the face load is increased. If the torics slide, this can produce a nonuniform load that can result in poor seal performance.

Results of incorrect assembly:

Point “A” and point “B” remain stationary.
Points “X” and “Y” rotate 180°.
This causes high pressure at “A”/“Y” and possible galling.
When rotated, points “B”/“X” has low pressure and possible leakage.
Assembly of the face seal

After the unit to be sealed is assembled, a post-assembly leakage test can be performed to insure the seal is properly installed. A vacuum check is recommended rather than a pressure check as vacuum checks are more sensitive. Many users find this an easy check to combine with a vacuum fill technique for the lubricant. It is recommended the compartment be filled to the correct level with lubricant and then rotated slowly several revolutions to seat the seals. A vacuum test will catch big seal damage such as broken seal rings or cut torics that may be caused in the last phases of assembly. The Duo-Cone seal is not designed to seal air, so some leakage can be expect using such a procedure.

Following these guidelines and recommendations should insure optimum performance from the Duo-Cone seals.
Assembly of planetary gear drive
Assembly of the ring gear and ring gear carrier
Assembly of the sun gear

Prepare the ring gear and the ring gear carrier
Heat the taper roller bearing inner ring with cage (1) to about 100°C and install it onto the ring gear carrier (2). Place the ring gear (3) onto the ring gear carrier. Bolt the retainer (5) with the screws (4), secure the screws with Loctite 270.

Assembly of the ring gear carrier
Install the ring gear carrier (2) with ring gear (3) into the wheel hub resp. onto the steering knuckle resp. axle spindle. The oil compensating hole in the ring gear carrier must be on the bottom. Subsequent adjust wheel bearings (see chapter 5.7).

Assembly of the thrust ring
Press the thrust ring (6) into the steering knuckle resp. axle spindle. Secure with Loctite 270.

Assembly of the sun gear
Slip the sun gear (7) onto the universal joint resp. axle shaft, install the circlip (9) and push the universal joint resp. axle shaft towards the inside until the circlip contacts to the sun gear and the sun gear contacts to the thrust ring.
Prepare planetary gear:
Install the needle bearing (10 resp. 11) into the planetary gear (12 resp. 13).

Insert the preassembled planetary gears (12 resp. 13) with needle bearings (10 resp. 11), rings (16) (if present) and thrust discs (14 resp. 15) into the planetary housing (22 resp. 23) (planetary housing in horizontal position).

Place o - ring (19) into the slot of the planetary housing (22). Because of the difference of diameter of 0,1 mm press the planetary pin (17 resp. 18) in direction of arrow. Be sure, that the bore hole of the locking pin in the planetary pin and planetary housing are aligned. After inserting, secure the planetary pin with the locking pin (20 resp. 21).
Adjustment of the axial clearance

The axial clearance between axle shaft resp. universal joint and thrust disc (27) in the planetary housing must be 0.3 - 0.7 mm.

Measure distances:

Dimension A =
Dimension B =
Required disc thickness =
A - B - axial clearance (0.3 - 0.7 mm)

Mount the correctly dimensioned thrust disc (if necessary, make final correction on a lathe) into the planetary housing. Secure with Loctite 270.

Assembly of the planetary housing

Place o - ring (30) into the slot of the planetary housing.

Install the planetary housing and bolt it.
Disassembly of planetary gear

Knock the locking pin (20 resp. 21) completely to the inner side of the planetary pin.

Press the planetary pin in direction of arrow out of the planetary housing.

**Attention:**
Because of the difference of diameter of 0.1 mm do not press the planetary pin against the direction of arrow out of the planetary housing, to prevent damaging the bore.

Remove the planetary gears with the thrust discs and needle bearings.
Assembly of service brake
Assembly of the wet disc brake

1. Brake carrier
2. Brake housing
3. Piston
4. Inner disc
5. Outer disc
6. O - ring
7. Screw
8. Screw plug
9. Seal ring
10. Seal ring
11. Connection peace
12. Breather
13. Sealing ring
14. Sealing ring
15. Spring
16. Screw
17. Seal ring
18. Screw plug
19. O - ring
20. Face seal
21. Screw
22. Tube
23. Bushing
24. Screw
Assembly of the piston seals

Place piston with the larger diameter downwards. Note succession of the sealing parts at fitting. Install o - rings free of torsion and loops.

Assembly of o - ring and supporting ring

1. large supporting ring
2. large o - ring
3. small o - ring
4. small supporting ring

Install the supporting rings to the averting side of pressure!

Assembly of the Omegat seal kit

1. large o - ring
2. small o - ring
3. large supporting ring
4. small supporting ring

Install the PTFE - profile rings with small diameter to pressure side! For assembly there can be used mounting tapes from Merkel Company.
Lubricate cylinder bore, apply the thread holes at wet disc brakes of dimension X270 and X340 with Loctite 243, at wet disc brakes of dimension X460, X550 and X650 with Loctite 262 and install and screw the bushing (if present). Place the piston onto the brake carrier (do not cant it!).

a) Wet disc brakes of dimension X270 and X340:

Press the piston equal by hand into the brake carrier (do not cant it!).

b) Wet disc brakes of dimension X460, X550 and X650:

Press the piston equal with mounting screws into the brake carrier (do not cant it!).

If necessary adjust the piston with easy hammer taps to the thread holes. Install first the springs, then the tubes in the bore holes of the piston. Screw in the hexagon head screws with flange.
Lay discs into the housing.

**Check the air gap:**

Air gap = measure A - measure B (measured without pressure)

Rated size about 0.5 mm smaller than the air gap pressurized (see table).

Install o-ring (brake housing/brake carrier) free of torsion and loops.
# Air gap and wear dimension

<table>
<thead>
<tr>
<th>brake type</th>
<th>air gap sL new</th>
<th>wear dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(pressurized)</td>
<td>(mm)</td>
</tr>
<tr>
<td></td>
<td>(mm)</td>
<td></td>
</tr>
<tr>
<td>3270</td>
<td>1,5 ± 0,75</td>
<td>1,2</td>
</tr>
<tr>
<td>3340</td>
<td>2,4 ± 0,6</td>
<td>1,2</td>
</tr>
<tr>
<td>3340-1</td>
<td>1,8 ± 0,5/ - 0,1</td>
<td>1,2</td>
</tr>
<tr>
<td>4340</td>
<td>2,5 ± 0,9</td>
<td>1,6</td>
</tr>
<tr>
<td>5340</td>
<td>2,4 ± 0,9</td>
<td>2,0</td>
</tr>
<tr>
<td>6340</td>
<td>2,8 ± 0,6</td>
<td>2,4</td>
</tr>
<tr>
<td>3460</td>
<td>2,5 ± 0,7/ - 0,1</td>
<td>1,2</td>
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<tr>
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<td>1,6</td>
</tr>
<tr>
<td>4460-1</td>
<td>2,25 ± 1,0/ - 0,1</td>
<td>1,6</td>
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<tr>
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<td>2,0</td>
</tr>
<tr>
<td>6460</td>
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<td>2,4</td>
</tr>
<tr>
<td>7460</td>
<td>3,0 ± 0,5/ - 0,1</td>
<td>2,8</td>
</tr>
<tr>
<td>8460</td>
<td>3,3 ± 0,5 / - 0,1</td>
<td>3,2</td>
</tr>
<tr>
<td>10460</td>
<td>4,0 ± 0,5/ - 0,1</td>
<td>4,0</td>
</tr>
<tr>
<td>5550</td>
<td>3,0 ± 0,5/ - 0,1</td>
<td>2,0</td>
</tr>
<tr>
<td>4650-1</td>
<td>3,5 ± 0,5/ - 0,1</td>
<td>1,6</td>
</tr>
<tr>
<td>6650-1</td>
<td>4,0 ± 0,5/ - 0,1</td>
<td>2,4</td>
</tr>
</tbody>
</table>
Place the brake carrier onto the brake housing and bolt it. Mount breather with connection piece and seal ring, screw plugs with seal rings.

Check brake hydraulic system for leaks (see tightness checking instruction).

Install o-ring (Brake carrier/ axle spindle resp. steering knuckle) free of torsion and loops.

**Check the air gap (pressurized):**

Measure through the check hole the distance from brake carrier to the piston end face, while non actuated brake, actuate the brake and repeat the measure operation - the difference of the measured distances gives the air gap sL (pressurized), rated size sL see table.

Measure through the check hole the distance from brake carrier to the piston end face, while actuating the brake and knock the measured value with marking punches into the brake carrier.

Install the complete brake on the axle (coat the contact surface with Loctite 270).

Mount face seal see chapter 5.8.

**Alignment of the discs**

Wet disc brake dimension X270 and X340:

The alignment of the discs has to be made at mounting of the wheel hub by itself.

Wet disc brake dimension X460 and X650:

The alignment of the discs has to be made by a mounting device (see chapter 3.6). Clamp the discs by actuating the brake (hydraulic or air pressure).
Tightness checking instruction for brake hydraulic system and cooling oil room

Check brake hydraulic system for leaks

Before conducting the test, bleed the brake hydraulic system.

The pressure drop after applying 120 bar for a period of 15 minutes must not exceed 2% (leaving 117.5 bar).

Test medium: Motor oil SAE 10 W corresponding to MIL - L 2104.

Check cooling oil room for leaks

Brake with external cooling:

After assembly of the wheel hub with the face seal and adjusting of the wheel bearings check the tightness of the cooling oil room:

Install an air pressure gauge with shutoff valve.

Beload the hub assembly with 1.5 bar pressure air.

Turn the hub assembly several times.

The pressure drop after a period of 10 minutes must not exceed 0.1 bar.

Brake without external cooling:

After assembly of the planetary gear drive check the tightness of the cooling oil room.

Install an air pressure gauge with shutoff valve.

Beload the hub assembly with 0.5 bar pressure air.

Turn the hub assembly several times.

The pressure drop after a period of 15 minutes must not exceed 0.1 bar.
Permissible oil for brake with external cooling

Actuation fluid:  
Do not use brake fluid at any time!  
Use a mineral oil base hydraulic oil type fluid only!

1) Motoroil API SE/ CD  
MIL - L - 46152C/ MIL - L - 2104 C o. D

2) ATF C - 3 or Dexron ®

3) Hydraulicoil HLP DIN 51524 Teil 2

Viscosity:

For moderate climate ISO VG 22 - 32
For extremely cold climate ISO VG 15
For extremely warm climate ISO VG 46

Cooling fluid:  
like actuation fluid.

Important: It is necessary to use oils with LS - additives  
(Limited Slip), according to the recommendation of the oil  
supplier.

For example: 3 - 6% Lubrizol LZ 6117/ LZ 9990 A or LZ 6279

Check measure:  
It is measured through the check hole, while actuating the  
brake.

The check measure, new, is marked in the housing below the  
hole.

Is the measured dimension bigger than the marked dimension  
and max. wear dimension, unconditional consult Kessler &  
Co.

After working at the brake, bleed the brake hydraulic system and check for tightness!
Assembly of parking brake
Safety notes:

WARNING!

Before commencing work on the parking brake, ensure that no unintended machine movement can happen when the braking effect is removed.
- Danger to life! -

DANGER!

The parking brake is under spring tension. Parts could become loose and fly out suddenly if improper brake opening.
- Danger to life! -
Therefore release the lock nut (2) and turn the adjusting screw (3) counter-clockwise until the spring set is released before disassembly of the circlip (1)!
1. Construction and function

The two identical brake pads and slide freely on the guide bolt, which is fastened in the housing. The guide bolts are guided in an additional brake anchor plate which in turn is screwed onto the vehicle, i.e. its axle.

On actuation, the brake generates a clamping force at the brake lining pads, which cause a tangential force braking moment to be generated at the brake disk, the extent of which depends on the coefficients of friction generated by the linings.

The clamping force is generated by the bank of cup springs, during which the piston is moved together with the adjusting screw, the thrust bolt and the brake pad towards the brake disk.

When the brake pad comes into contact with the brake disk, the reaction force shifts the housing onto the guide bolts until the brake pad is also pressed against the brake disk.

The brake is released by complete pre-tensioning of the bank of cup springs. During this process, through application of the necessary release pressure after overcoming the cup spring force, the piston must move back until it comes to rest against the pressure ring.

The clamping force diminishes with wear of the brake lining and brake disk. The brake must be adjusted at the latest at the times indicated by the adjusting specification below.
2. Mounting and basic setting regulations

Basic brake setting is required after mounting new brake lining plates or brake disks, as well as during all repair stages and in the event of insufficient braking performance.

Note:

All mounting and basic setting work must be carried out on the brake when cold.

2.1. Mounting the brake

1. Stand the vehicle on an even surface and secure against rolling away.
2. Release the screw cap.
3. Release the lock nut (size 24 or 30) and turn the adjusting screw anticlockwise using a size 8 or 10 socket wrench until the pressure bolt comes to rest against the even surface of the piston. In this status, the brake can be mounted onto the brake disk and fastened.
4. Mount the pressure connection again.

Apply the necessary release pressure to the brake until the bank of cup springs is completely pre-tensioned
Following carry out the below described basic setting regulation.
2.2. Basic setting regulation

1. Turn the adjusting screw manually clockwise until both brake pads make contact with the brake disk. Then it is no longer possible to turn the adjusting screw without exerting a major amount of force.

2. Turn the adjusting screw anticlockwise in order to set the following rated clearances:

<table>
<thead>
<tr>
<th>type</th>
<th>adjusting screw</th>
<th>clearance (mm)</th>
<th>turns</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSG90</td>
<td>M16 (SW 8)</td>
<td>min. 0,5</td>
<td>1/4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clearance 1,0</td>
<td>1/2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 1,5</td>
<td>3/4</td>
</tr>
<tr>
<td>FSG110</td>
<td>M20 (SW 10)</td>
<td>min. 1,0</td>
<td>2/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clearance 2,0</td>
<td>4/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>max. 3,0</td>
<td>1 1/5</td>
</tr>
</tbody>
</table>

3. Hold the adjusting screw in position with a hexagonal socket wrench and lock with lock nut.

4. Mount the screw cap and tighten as far as possible manually.

5. Stellen Sie den Druckanschluß gemäß aer Vorschrift der Achs- bzw. Getriebeshersteller her. Mount the pressure connection in accordance with the instructions of the axle / gear manufacturer.

For bleeding the piston chamber use the socket spanner size 13 for the bleeding valve.

2.3. Adjusting regulations

During this adjusting process, the parking brake must be released, i.e. the bank of cup springs must be completely pre-tensioned.

1. Stand the vehicle on an even surface and secure against rolling away.

2. Release the parking brake by using the required release pressure.

3. Release the screw cap and unscrew.

4. Release the lock nut (size 24 or 30) and turn the adjusting screw with socket wrench size 8 or 10 manually clockwise until the two brake pads make contact with the brake disk.

5. Turn the adjusting screw anti-clockwise and set the clearance specified in the above table.

6. Hold the adjusting screw in position with the hexagonal socket wrench and lock with the lock nut.

7. Mount the screw cap and tighten as far as possible manually.

Actuate the brake valve several times and check the braking efficiency of the parking brake on a slope.
3. Emergency release of the parking brake

After the failure of the pressure release the parking brake by using following manual procedure:

1. The vehicle has to be secured against rolling away.
2. Release the screw cap and unscrew.
3. Release the lock nut (size 24 or 30) and turn the adjusting screw with socket wrench size 8 or 10 manually counter-clockwise until the brake disc is free.

**Caution!**

*For the emergency release is an actuation torque of 40 Nm respectively 70 Nm required.*

4. Mount the lock nut and the screw cap and tighten both as far as possible manually. *(Protection against dirt*

**Caution!**

*Now, the vehicle do not have any brake function. The vehicle must be secured against moving away with proper means. Before putting the vehicle into operation again, the brake has to be adjusted again. Res. „Assembly and basic setting regulations“.*
4. Maintenance and repair work

4.1. Maintenance and exchange of brake pads

The brake pads themselves are maintenance free. All that is required here is a check for damaged parts, as well as inspection to ensure that the brake disk remains easy running.

The thickness of the brake lining must be subjected to a visual inspection at regular intervals, which depend on vehicle usage, but every six months at the latest. In the event of a minimal residual lining thickness, these intervals must be reduced accordingly in order to avoid major damage to the brake or disk:

- FSG 90:
  - min. residual thickness 1.0 mm per lining pad (6 mm carrier plate thickness).
- FSG 100:
  - min. residual thickness 2.0 mm per lining pad (8 mm carrier plate thickness).

Note:

Only Knott original spare lining plates may be used. If any other spare parts are used, no warranty claims will be accepted either for the brakes or their functional characteristics.

1. Stand the vehicle on an even surface and secure against rolling away.
2. Release the parking brake by applying the required release pressure.
3. Release the screw cap and unscrew.
4. Release the lock nut (size 24 or 30) and turn the adjusting screw with socket wrench size 8 or 10 manually clockwise until it lies flush with the inside of the piston.
5. Press back the thrust bolt using a suitable screwdriver until it has contact with the piston.
6. Depending on the free space available, release one of the two guide bolts, removing the safety splint, unscrewing the castellated nut and pulling the guide bolt out of the brake anchor plate. Now, the brake lining pads can be removed tangentially to the brake disk.

**Note:**

In the event of minimal clearance, i.e. it is *not* possible for space reasons to exchange the brake lining plate in accordance with these instructions, the brake must be removed completely. To do this, pull both guide bolts out of the brake anchor plate.

**Caution!**

Check the pressure hose. If the pressure hose is too short, it must be unscrewed to remove the brake. Before the pressure hose can be released the brake must be emergency released.

7. Exchange the brake pads and insert the guide bolts into the brake anchor plate. If you have removed the complete brake you have to amount the brake on both guide bolt again, now.

8. Check both permanent magnets if they still have sufficient magnetic force to hold the brake lining plates. Should this not be the case, the permanent magnets must also be changed by using a suitable screwdriver.

9. Secure the guide bolt with the castellated nut and the safety splint res. safety clip.

**Note:**

After mounting new brake lining plates or their repair, the brake must be correctly set in accordance with the instructions „Adjusting regulations“. 
4.2. Changing the seal

Faulty seals must be exchanged in accordance with the instructions below:

1. Stand the vehicle on an even surface and secure against rolling away.
2. Release the parking brake by applying the necessary release pressure.
3. Release the screw cap and unscrew.
4. Release the lock nut (size 24 or 30) and turn the adjusting screw with socket wrench size 8 or 10 manually counterclockwise until the adjuster screw is flush with the inner side of the piston.
5. Push back the thrust bolt until it has contact with the piston. Following actuate the hand brake valve. (no pressure must be in the piston chamber). The bank of cup springs is now completely depressurized.
6. Unscrew the pressure hose and remove the brake.
7. Release the circlip and remove the pressure ring of the housing.
8. Release the bank of cup springs and the piston.

Caution!

Pay attention to the mounting direction of the seal rings, otherwise leaks can occur.

Use for mounting the new seal rings a suitable mounting needle with rounded edge. Be careful.
9. Change all seals and mount the parts of the brake in other way round order. By mounting the piston, the sliding and sealing surfaces must be greased lightly using lubricating grease to DIN 51825. The dust protection cap is fitted with a vulcanized-in steel ring which is used to press it through the locating hole. For exchanging, "lever out" the ring using a suitable tool. The new dust protection cap must be pressed in with the aid of a suitable mounting ring and screw clamps or a lever press.

Mount the brake in accordance with the above procedure into the vehicle / at the axle.

4.3. General

Any discovered defects or damage to parts not listed here must naturally be repaired or replaced using original parts.

For any other information not contained in these instructions or for more detailed instructions, please contact the vehicle or brake manufacturer.