1 General

1.1 General Maintenance Information

2 Safety

3 Conversion of the Hub

3.1 Converting the Hub [Inserted Adapters]

3.2 Converting the Hub [Pressed on Adapters]

4 Maintenance of the Hub

4.1 Safety

4.2 Maintenance of the Front Wheel Hub [Inserted Adapters Version 1]

4.3 Maintenance of the Front Wheel Hub [Inserted Adapters Version 2]

4.4 Maintenance of the Front Wheel Hub [Pressed on Adapters]

4.5 Maintenance of the Rear Wheel Hub [Ratchet System®]

4.6 Maintenance of the Rear Wheel Hub [Two Pawl System]

4.7 Maintenance of the Rear Wheel Hub [Three Pawl System]

5 Maintenance of the Wheel

5.1 Safety

5.2 Special Tools

5.3 Truing the Wheel

5.4 Changing a Single Spoke [MTB]

5.5 Changing a Single Spoke [ROAD]

5.5.1 Loosening the Spoke

5.5.2 Changing a Single Spoke on the Front Wheel [Slotted Hub]

5.5.3 Removing a Single Spoke on the Front Wheel [Non-Slotted Hub]

5.5.4 Changing a Single Spoke on the Rear Wheel

5.6 Rebuilding the Wheel [ROAD]

5.6.1 Putting on the Spokes on the Front Wheel

5.6.2 Putting on the Spokes on the Rear Wheel

5.6.3 Connecting the «Spoke Tree» to the Rim

5.7 Rebuilding the Wheel [MTB]
### Technical Data

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Spoke Tension</td>
<td>74</td>
</tr>
<tr>
<td>6.2</td>
<td>Tolerances</td>
<td>74</td>
</tr>
</tbody>
</table>
1 General

Validity
This manual describes the component shown on the front page and the footer. It is valid for the construction level of the component on the 2013-11-25. Deviations are possible and all items are subject to technical changes.

Safety
The safety instructions are classified as follows:

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>...characterizes danger for goods.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>...characterizes danger with a high risk, which causes mayhem if it is not being avoided.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>...characterizes immediate danger with a high risk, which causes death or mayhem if it is not being avoided.</td>
</tr>
</tbody>
</table>

Target Group
This manual is intended for the end user and dealers. For experienced users, it offers the possibility to carry out small maintenance works on their own. If there are any doubts concerning the own skills, there should be contacted a DT Swiss service center. Warranty will expire if works are not done properly.

Layout
The cover page and the footing are providing information about the type of product and manual as well as the version of the manual.

The backside provides a list of the DT Swiss service centers. A list of all DT Swiss service centers can be found at www.dtswiss.com.

This manual is intended for being printed as a A5 booklet. Only print this manual if electronical usage is not possible.
DT Swiss Manual Concept

The DT Swiss manuals are splitted into the following types of manuals:

- User Manual
  Information for the end user of how to install and use the component.
- Technical Manual
  Detailed information for the end user and the dealer of how to maintain the component, spare parts and technical data.

How to Use this Manual

The steps described in this manual must be carried out in the order they are shown. If steps are ignored or executed in a wrong order, the function of the component cannot be guaranteed.

Instructions are beginning with the table «Preparatory Steps» and ending with the table «Closing Steps». The instructions in these tables must be carried out.

Moving parts, threads, o-rings and sealings must be greased before assembling.

Cross References

In order to simplify the use of this manual, some text is edited as hypertext. Whenever the text is formatted blue and underlined, you can click on the text. After clicking you will be automatically redirected to the target of the link.

Example: Click here: chap. 1, page 3 to jump to the beginning of this chapter.

Warranty (Europe)

In addition to the general guarantee required by law, DT Swiss AG based in Biel/Switzerland, provides a guarantee for 24 months from the date of purchase in accordance with European Directive 99/44/EC. DT Swiss AG shall reject any liability for both indirect damage caused by accidents and consequential damage.

Any contradictory or extended national rights of the purchaser are not affected by this warranty. Place of performance and jurisdiction is Biel/Switzerland. Swiss law shall apply.

Submit any warranty claims to your retailer or a DT Swiss service center. Any defects recognised by DT Swiss AG as a warranty claim will be repaired or replaced by a DT Swiss service center.

Warranty and guarantee claims can only be made by the original purchaser with a valid sales receipt.

There shall be no claim under the guarantee for:

- Normal wear and tear caused by use of the components
- Incorrect assembly
- Incorrect or non existent maintenance
- Incorrectly completed repairs
- Use of unsuitable products
- Modification of components
- Incorrect use or misuse
- Carelessness
- Leasing, commercial use or use in competitions
- Damage caused by accidents
- Delivery and transport damage
- Modification, defacing or removal of the serial number
Limited Equipment Warranty USA

DT Swiss LTD makes every effort to assure that its product meets high quality and durability standards and warrants to the original retail consumer/purchaser of our product that each product is free from defects in materials and workmanship as follows:

2 YEAR LIMITED WARRANTY ON THIS DT SWISS PRODUCT. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities or to a lack of maintenance.

DT SWISS LTD LIMITS ALL IMPLIED WARRANTIES TO THE PERIOD OF TWO YEARS FROM THE DATE OF INITIAL PURCHASE AT RETAIL. EXCEPT AS STATED HEREIN, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS ARE EXCLUDED. SOME STATES MAY NOT ALLOW LIMITATIONS ON HOW LONG THE IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. DT SWISS LTD SHALL IN NO EVENT BE LIABLE FOR DEATH, INJURIES TO PEOPLE OR PROPERTY OR FOR INCIDENTAL, CONTINGENT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF OUR PRODUCTS. SOME STATES MAY NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

To take advantage of this warranty, the product or part must be returned for examination, postage prepaid, to the dealer where you bought the product or to a DT Swiss service center. Proof of purchase date and an explanation of the complaint must accompany the product. If our inspection discloses a defect, DT Swiss will either repair or replace the product or refund the purchase price, if we cannot readily and quickly provide a repair or replacement. DT Swiss will return repaired product or replacement at DT Swiss expense, but if it is determined there is no defect, or that the defect resulted from causes not within the scope of this warranty, then the user must bear the cost of shipping. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Legal venue and place of performance is Biel (Switzerland). Swiss law shall apply. Subject to technical changes. Please keep the user manual and warranty for future use.
1.1 General Maintenance Information

Cleaning
For an optimal result of the maintenance works, every component that will be disassembled must be cleaned. There may only be used cleaners which do not damage the components. Especially the cleaning of o-rings and sealings requires mild cleaners. Always consider the instructions of the respective cleaner.

DT Swiss recommends the following cleaners:
- Motorex Rex
- Motorex Swissclean
- Motorex OPAL 2400, OPAL 3000, OPAL 5000

Use soap water or similar mild cleaners for external cleaning.

Tools
To ensure a damage-free mounting and dismounting of the components, only use the tools which are mentioned in this manual. The usage of differing tools is up to the user. If components are being damaged by the usage of differing tools, the user is liable.

Environmental Protection
Whenever possible, waste has to be avoided. Waste, especially carbon, lubricants, cleaners and any other fluids must be disposed in an environmentally compatible manner.

Only print this manual, if electronical usage is not possible.

Disclaimer
The operations described in this manual should only be done by professionals. The user is liable for any damage or consequential damage which is caused by wrong maintained or wrong installed components. If you have doubts, please contact a DT Swiss service center.
2 Safety

DANGER

Incorrect handling, installation, maintenance or servicing can lead to accidents causing severe injuries or death!

- Compliance with the following provisions is a prerequisite for accident-free use and faultless functioning.
- Assembly and maintenance of the component requires a basic knowledge of handling bicycle components. If in any doubt, consult your retailer.
- Components should only be used in accordance with their intended use, otherwise the user shall assume full responsibility.
- The component must be compatible with all parts of the bicycle.
- Only use original spare parts.
- The components must not be changed or modified.
- The component must not be used if it is damaged or there are any signs of damage. If in any doubt, consult a DT Swiss service center.

DANGER

Risk of death caused by incorrectly assembled or faulty wheels and hubs!

- Check that the wheel is connected correctly before each ride.
- Before every use, check the function of the rear wheel hub. Make sure that the freewheel and engagement connection function impeccably. Should there be any malfunction, the rear wheel hub must not be used.
- Check the wheel for damage before and after each ride.
- Regularly check the spoke tension, rotation and wear of the wheel.
### 3 Conversion of the Hub

The hubs can be converted to the following axle version:

#### Wheels 2013

<table>
<thead>
<tr>
<th>Wheel</th>
<th>Front Wheel Option</th>
<th>Rear Wheel Option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5/100 mm QR</td>
<td>Link</td>
</tr>
<tr>
<td></td>
<td>9/100 mm Thru Bolt</td>
<td>5 mm QR</td>
</tr>
<tr>
<td></td>
<td>15/100 mm Thru Axle</td>
<td>10/135 mm Thru Bolt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12/135 mm Thru Axle</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12/142 Thru Axle</td>
</tr>
</tbody>
</table>

#### ROAD 2013

| RC 38  | ●         | ●         | ● | - |
| R 28   | ●         | ●         | ● | - |
| R 23   | ●         | ●         | ● | - |

#### MTB 2013

| X 1600 | ●         | ●         | ● | chap.3.2, p.13 | ○ | ○ | ● | ● | chap.3.1, p.10 |
| X 1900 | ●         | ●         | ● | chap.3.2, p.13 | ● |   |   |   | -               |
| XR 1450| ○         | ●         | ● | chap.3.1, p.10 | ○ | ● | ● | ● | chap.3.1, p.10 |
| XR 1501| ○         | ○         | ● | chap.3.1, p.10 | ○ | ○ | ○ | ● | chap.3.1, p.10 |
| XM 1501| ○         | ○         | ● | chap.3.1, p.10 | ○ | ○ | ○ | ● | chap.3.1, p.10 |
| M 1700 | ●         | ●         | ● | chap.3.2, p.13 | ○ | ○ | ● | ● | chap.3.1, p.10 |
| EX 1501| ○         | ○         | ● | chap.3.1, p.10 | ○ | ○ | ○ | ● | chap.3.1, p.10 |

- ● Standard
- ○ Option
- ◆ Convertible with included accessories
## Wheels 2014

<table>
<thead>
<tr>
<th>Wheel</th>
<th>Front Wheel Option</th>
<th>Rear Wheel Option</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>5/100 mm QR</td>
<td>5 mm Link</td>
</tr>
<tr>
<td></td>
<td>9/100 mm Thru Bolt</td>
<td>10/135 mm Thru Axle</td>
</tr>
<tr>
<td></td>
<td>15/100 mm Thru Axle</td>
<td>12/135 mm Thru Axle</td>
</tr>
<tr>
<td></td>
<td>20/110 mm Thru Axle</td>
<td>12/142 mm Thru Axle</td>
</tr>
<tr>
<td></td>
<td>Link</td>
<td>12/150 mm Thru Axle</td>
</tr>
</tbody>
</table>

### ROAD 2014

<table>
<thead>
<tr>
<th></th>
<th>RC 28</th>
<th>RC 38</th>
<th>RC 46</th>
<th>RC 55</th>
<th>R 23</th>
<th>R 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/100 mm QR</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>9/100 mm Thru Bolt</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15/100 mm Thru Axle</td>
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<td>○</td>
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<tr>
<td>20/110 mm Thru Axle</td>
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### MTB 2014

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<th>XR 1450</th>
<th>XR 1501</th>
<th>XM 1501</th>
<th>X 1900</th>
<th>M 1700</th>
<th>M 1900</th>
<th>EX 1501</th>
<th>EX 1750</th>
<th>EX 1750 12/150mm</th>
<th>E 1900 20/110mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<td>○</td>
<td>chap.3.1, p.10</td>
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<tr>
<td></td>
<td>●</td>
<td>○</td>
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<td>chap.3.1, p.10</td>
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<td>chap.3.1, p.10</td>
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<td>chap.3.1, p.10</td>
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<tr>
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<td>●</td>
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<td>chap.3.1, p.10</td>
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<td>○</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<td>○</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
</tr>
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<td></td>
<td>○</td>
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<td>○</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
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<td>chap.3.1, p.10</td>
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<td>chap.3.1, p.10</td>
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<td>○</td>
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<td>chap.3.1, p.10</td>
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<td>○</td>
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<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<td>○</td>
<td>chap.3.1, p.10</td>
</tr>
<tr>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
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<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
<td>○</td>
<td>○</td>
<td>chap.3.1, p.10</td>
</tr>
</tbody>
</table>

- ● Standard
- ○ Option
- ○ Convertible with included accessories
3.1 Converting the Hub [Inserted Adapters]

Preparatory Steps

| Rear wheel: Remove the cassette if necessary. | see instructions of the manufacturer |

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>universal grease</td>
<td></td>
<td>as required</td>
</tr>
</tbody>
</table>

**NOTE**

*Risk of damage of the adapters!*

To avoid damages, only use grind clamping jaws, aluminium clamping jaws or special tools to clamp the adapters.

**NOTE**

*Deviation of the figures!*

For simplification, the conversion of the hubs is only shown with a rear wheel QR hub. The following actions are valid for all hubs with inserted adapters.

Removing the Adapter

1. Clamp the left adapter into a vice using an axle holder.
2. Pull the hub or the wheel upwards.
3. Clamp the right adapter into a vice using an axle holder.
4. Pull the hub or the wheel upwards.
Cleaning and Greasing the Adapter

1. Clean both adapters and the accessible parts of the hub with a dry cloth.

2. Grease the bearing and the contact surface of the adapter.

Putting on the Adapters

1. Put the left and the right adapter onto the hub. Caution: If the adapters have different lengths, the shorter adapter must be put to the drive side.
2. Push in the adapters by hand.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear wheel: Put on the cassette if necessary (see instructions of the manufacturer).</td>
<td></td>
</tr>
</tbody>
</table>
3.2 Converting the Hub [Pressed on Adapters]

<table>
<thead>
<tr>
<th>Preparatory Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>not required</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>multi purpose grease</td>
<td></td>
<td>as required</td>
</tr>
<tr>
<td>adapter</td>
<td>adapter 15 mm to QR</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE**

**Limited conversion options!**

Hubs with pressed on adapters can’t be converted to a different axle diameter by changing the adapters. Only the 15 mm version can be converted by inserting a special adapter.

1. Grease the adapter with multi purpose grease.

2. Slide the adapter into the hub.

<table>
<thead>
<tr>
<th>Closing Step</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>not required</td>
<td></td>
</tr>
</tbody>
</table>
## 4 Maintenance of the Hub

This chapter describes a small hub service. It includes:

- Removing, cleaning, greasing and mounting the adapters
- Removing, cleaning, greasing and mounting the rotor
- Cleaning and greasing the freewheel system

The description of a big hub service can be found in the Technical Manual of the desired hub at www.dtswiss.com.

### Hub Technologies

The following table provides an overview of all hub technologies which are part of DT Swiss SPLINE wheels. The link in the header directly forwards you to the required chapter.

<table>
<thead>
<tr>
<th>Front Wheel</th>
<th>Rear Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>front wheel with inserted adapters version 1</td>
<td>rear wheel with Ratchet System®</td>
</tr>
<tr>
<td>chap.4.2, p.17</td>
<td>chap.4.5, p.26</td>
</tr>
<tr>
<td>front wheel with inserted adapters version 2</td>
<td>rear wheel with two pawl system</td>
</tr>
<tr>
<td>chap.4.3, p.19</td>
<td>chap.4.6, p.32</td>
</tr>
</tbody>
</table>

### ROAD 2013

<table>
<thead>
<tr>
<th></th>
<th>Front Wheel</th>
<th>Rear Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC 38</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>R 28</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>R 23</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### MTB 2013

<table>
<thead>
<tr>
<th></th>
<th>Front Wheel</th>
<th>Rear Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 1600</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>X 1900</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>XR 1450</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>XR 1501</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>XM 1501</td>
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<tr>
<td>M 1700</td>
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<td>●</td>
</tr>
<tr>
<td>EX 1501</td>
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</tbody>
</table>

### ROAD 2014

<table>
<thead>
<tr>
<th></th>
<th>Front Wheel</th>
<th>Rear Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC 28</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>RC 38</td>
<td>●</td>
<td>●</td>
</tr>
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<td>RC 46</td>
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<td>●</td>
</tr>
<tr>
<td>RC 55</td>
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<td>●</td>
</tr>
<tr>
<td>R 23</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Service Intervals

The following periodic maintenance and service works are recommended by DT Swiss:

<table>
<thead>
<tr>
<th>Action</th>
<th>Interval</th>
</tr>
</thead>
</table>
| Small service (see following) | • normal operating conditions: 6 months  
• extreme operating conditions (frequent rides in rain, mud, snow): as required |
| Big service (see Technical Manual at www.dtswiss.com) | • normal operating conditions: 12 months  
• extreme operating conditions (frequent rides in rain, mud, snow): as required |
| Check the hub for damages. | before and after each ride |
| Cleaning with a soft sponge and an appropriate cleaner. Do not use high pressure cleaners or aggressive cleaners. | after each ride |
4.1 Safety

**DANGER**

Danger to life due to incorrect maintenance or wrong spare parts!

Wrong maintenance, wrong assembly or wrong spare parts can lead to unpredictable errors.

- Maintenance must only be done by professionals.
- Only use original spare parts or spare parts released by DT Swiss.
- In case of any doubts, contact a DT Swiss service center.
4.2 Maintenance of the Front Wheel Hub [Inserted Adapters Version 1]

**Preparatory Steps**
- not required

**Required Material**
- multi purpose grease

**Specification**
- as required

**NOTE**

Risk of damage of the adapters!

To avoid damages, only use grind clamping jaws, aluminium clamping jaws or special tools to clamp the adapters.

**Removing the Adapters**

1. Clamp one of the adapters (fig.4.1/1, 5) into a vice.
2. Pull off the wheel, respectively the hub.
3. Clamp the second adapter into the vice.
4. Pull off the wheel, respectively the hub.
Cleaning and Greasing the Parts

1. Clean the hub, the bearings and the adapters (see Cleaning, p.6).
2. Check the bearings. If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtdswiss.com).
3. Grease the bearings (fig.4.1/2) and the contact surface of both adapters (fig.4.1/1, 5) with multi purpose grease.

Putting on the Adapters

1. Put both adapters (fig.4.1/1, 5) onto the hub by hand.
   Caution: If the adapters have different lengths, the shorter adapter must be put to the drive side.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>not required</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Maintenance of the Front Wheel Hub [Inserted Adapters Version 2]

**figure 4.2:** Overview: front wheel with inserted adapters (version 2)

1. Remove the adapters (fig.4.2/1) from the hub by hand.
Cleaning and Greasing the Parts

1. Clean the hub, the bearings and the adapters (see Cleaning, p.6).
2. Check the bearings.
   If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtswiss.com).
3. Grease the bearings and the contact surface of both adapters (fig.4.2/1) with multi purpose grease.

Putting on the Adapters

1. Put both adapters (fig.4.2/1) onto the hub by hand.

Closing Steps

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>not required</td>
<td></td>
</tr>
</tbody>
</table>
4.4 Maintenance of the Front Wheel Hub [Pressed on Adapters]

**Preparatory Steps**

not required

**Required Material**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>multi purpose grease</td>
<td>as required</td>
</tr>
</tbody>
</table>

**Required Tools**

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>tool set for Ø 15 mm</td>
<td>HWTTXX00N5290S</td>
</tr>
<tr>
<td></td>
<td>consists of mounting pin and moun-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ting bushing</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>tool set for Ø 20 mm</td>
<td>HWTTXX00N5292S</td>
</tr>
<tr>
<td></td>
<td>consists of mounting pin and moun-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ting bushing</td>
<td></td>
</tr>
</tbody>
</table>
Removing the Adapters

NOTE

Risk of damage to the adapters and the ball bearings!

The mounting pin must not touch the ball bearing while disassembling the adapters.

1. Plug the mounting pin of the tool set into one of the adapters (fig.4.3/2/8).
2. Push the mounting pin downwards (see picture).
3. Remove the adapter (fig.4.3/2/8) and the cover (fig.4.3/1).
4. Repeat steps on the second adapter.
Cleaning and Greasing the Parts

1. Clean the adapters (fig. 4.3/2, 8), the covers (fig. 4.3/1) and the accessible parts of the hub (see Cleaning, p. 6).

2. Grease the bearings (fig. 4.3/3).

3. Check the bearings.
   If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtswiss.com).
Putting on the Left Adapter

1. Put the cover (fig.4.3/1) and the left adapter (fig.4.3/2) onto the hub.

2. Put the small diameter of the mounting bushing of the tool set onto the left adapter (fig.4.3/2).

3. Slide the mounting pin into the mounting bushing.

4. Drive the cover (fig.4.3/1) onto the hub.
Putting on the Right Adapter

1. Put the right adapter (fig.4.3/8) and the cover (fig.4.3/1) onto the hub.

2. Put the big diameter of the mounting bushing of the tool set onto the right adapter.

3. Slide the mounting pin into the mounting bushing.

4. Drive the cover onto the hub.

Closing Steps

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>not required</td>
<td></td>
</tr>
</tbody>
</table>
4.5 Maintenance of the Rear Wheel Hub [Ratchet System®]

Preparatory Steps

- Remove the cassette.

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>grease for star ratchet</td>
<td>DT Swiss special grease</td>
<td>as required</td>
</tr>
<tr>
<td>multi purpose grease</td>
<td></td>
<td>as required</td>
</tr>
<tr>
<td>star ratchet service kit</td>
<td>includes two star ratchets, two springs and DT Swiss special grease</td>
<td>as required</td>
</tr>
</tbody>
</table>

**NOTE**

**Risk of damage of the adapters!**

To avoid damages, only use grind clamping jaws, aluminium clamping jaws or special tools to clamp the adapters.
Removing Adapters, Rotor and the Ratchet System®

1. Clamp the left adapter (fig.4.4/1) into a vice.
2. Pull off the wheel, respectively the hub.
3. Clamp the left adapter (Abb.4-4/13) into a vice.
4. Pull off the wheel, respectively the hub. Take care that the rotor does not fall off.

5. Pull the rotor (fig.4.4/12) off the hub.

6. Take the springs (fig.4.4/10), the star ratchet (fig.4.4/11) and the spacer (fig.4.4/9) off the hub.
Cleaning and Checking the Parts

1. Clean all parts of the hub (see Cleaning, p.6).
2. Check all parts for damages and wear.
3. Check the bearings.
   If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtswiss.com).

4. Clean the toothing of the rotor and the ring nut.

5. Check the rotor for damages.
   Grooves from the cassette are no damages. These are normal signs of usage.
6. Remove bad notches from the rotor using a file.
7. Clean the rotor. Metal filings must be removed completely.
Putting on the Ratchet System®

1. Clean the outer and the inner toothing of the star ratchets using DT Swiss special grease. For an optimal functionality, a thin layer of grease is sufficient.

2. Grease the toothing of the rotor using DT Swiss special grease.

3. Grease the bearing on the drive side using multi purpose grease. Caution: There must not get grease onto the toothing of the star nut.

4. Put on the spacer (fig.4.4/9) and the first spring (fig.4.4/10). The big diameter of the spring must be placed on the bearing of the hub.
5. Put on both star ratchets (fig.4.4/11) and the second spring (fig.4.4/10). The small diameter of the spring must be placed on the star ratchet.

Put on the Rotor and the Adapters

1. Grease the rotor and put it onto the hub.
2. Check if the rotor can be turned easily and if the star ratchets are locking.
3. Grease both bearings and the contact surface of the adapters (fig.4.4/1/13).
4. Put both adapters (fig.4.4/1/13) onto the hub. Note: The shorter adapter must be placed on the drive side.
5. Push the adapters in by hand.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount the cassette.</td>
<td>see instructions of the manufacturer</td>
</tr>
</tbody>
</table>
4.6 Maintenance of the Rear Wheel Hub [Two Pawl System]

![Overview: Two Pawl System](image)

1 knurled disc  
2 adapter right  
3 ball bearing  
4 axle  
5 screw fitting for pawl carrier  
6 hub shell  
7 sticker  
8 pawl carrier  
9 pawl  
10 spring  
11 needle cage  
12 bearing shell  
13 ball bearing  
14 rotor  
15 adapter left

**Preparatory Steps**

<table>
<thead>
<tr>
<th>Preparatory Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove the cassette.</td>
<td>see instructions of the manufacturer</td>
</tr>
</tbody>
</table>

**Required Material**

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>multi purpose grease</td>
<td>as required</td>
<td></td>
</tr>
<tr>
<td>two pawl service kit</td>
<td>includes spring, two pawls, multi purpose grease</td>
<td>as required</td>
</tr>
<tr>
<td>needle cage kit</td>
<td>includes needle cage and 12 needles</td>
<td>as required</td>
</tr>
</tbody>
</table>

**NOTE**

**Risk of damage of the adapters!**

To avoid damages, only use grind clamping jaws, aluminium clamping jaws or special tools to clamp the adapters.
Removing Adapters, Rotor and Rotor Sealing

1. Clamp the axle at the non drive side into a vice using the axle holder.
2. Loosen the knurled disc (fig.4.5/1) on the drive side using a 17 mm wrench.

3. Clamp the axle at the drive side into a vice using the axle holder.
4. Loosen the knurled disc (fig.4.5/1) on the non drive side using a 17 mm wrench.

5. Unscrew and remove the knurled disc (fig.4.5/1) and the adapter (fig.4.5/15).

6. Pull off the rotor (fig.4.5/14) carefully.
7. Remove the adapter (fig. 4.5/2).

8. Remove the rotor sealing.
Removing the Pawl, the Spring and the Needle Cage

1. Lever the spring (fig.4.5/10) out of the groove. Caution: If the spring is bent or damaged, it must be exchanged.

2. Slide the spring (fig.4.5/10) upwards over the bearing shell (fig.4.5/12) and remove it.

3. Remove both pawls (fig.4.5/9).

4. Slide the needle cage (fig.4.5/11) upwards over the bearing shell (fig.4.5/12) and remove it.
Cleaning and Checking the Parts

1. Clean the spring (fig.4.5/10), pawl (fig.4.5/9), needle cage (fig.4.5/11) and all accessible parts of the hub (see Cleaning, p.6).

2. Check the bearings. If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtswiss.com).

3. Check the needle cage, the pawls and the spring for damages and replace them if required.

4. Clean the rotor (fig.4.5/14) using a mild cleaner.

5. Check the rotor for damages. Grooves from the cassette are no damages. These are normal signs of usage.

6. Clean the rotor using a mild cleaner.

7. Check the rotor sealing. Exchange a damaged sealing.

8. Remove bad notches from the rotor using a file.

9. Clean the rotor. Metal filings must be removed completely.

10. Clean the adapters (fig.4.5/2, 15) and the knurled discs (fig.4.5/1) using a mild cleaner.
Mounting the Needle Cage, the Pawl and the Spring

1. Grease the needle cage (fig.4.5/11) and the needles using multi purpose grease.

2. Grease the bearing shell (fig.4.5/12), the inner surface of the hub shell, the axle and the thread using multi purpose grease.

3. Slide the needle cage (fig.4.5/11) onto the hub and attach the needles using forceps (or s.th. similar).

4. Check if all needles are attached correctly inside the needle cage.

5. Attach both pawls (fig.4.5/9).
   Grease the pawls generously. This way, the pawls stuck in the correct position.
6. Slide a new spring (fig.4.5/10) onto the bearing shell (fig.4.5/12). The spring must not be damaged while mounting!

7. Slide the spring (fig.4.5/10) onto the pawls (fig.4.5/9).

8. Check, if the spring sits inside the groove over the complete circumference.

9. Check, if the pawls can be moved.

10. Grease the pawls (fig.4.5/9) slightly using multi purpose grease.

11. Grease the bearing generous.
Mounting the Rotor and the Rotor Sealing

1. Grease the rotor sealing using multi purpose grease.

2. Mount the rotor sealing.
   The sealing lip must face to the rotor (see picture).

3. Fill the seat of the needle cage with multi purpose grease.

4. Slide the rotor (fig.4.5/14) onto the hub while performing a rotary motion.

5. Check if the rotor can be turned easily and if the pawls lock.
Mounting the Adapters

1. Grease the bearings and the inner surface of the adapters.

2. Put the right adapter (fig.4.5/15) onto the drive side.

3. Put the left adapter (fig.4.5/2) on the non drive side of the hub.

4. Attach both knurled discs (fig.4.5/1) and tighten them by hand.

5. Put the knurled disc at the non drive side into a vice. Ensure that only the knurled disc is clamped.

6. Tighten the knurled disc with a torque of 17 Nm using a 17 mm wrench.

7. Take the hub out of the vice.

8. Check both knurled discs for the correct torque.
<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount the cassette</td>
<td>see instructions of the manufacturer</td>
</tr>
</tbody>
</table>
4.7 Maintenance of the Rear Wheel Hub [Three Pawl System]

**Preparatory Steps**

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>multi purpose grease</td>
<td>-</td>
<td>as required</td>
<td>see instructions of the manufacturer</td>
</tr>
<tr>
<td>service kit 3 pawl system</td>
<td></td>
<td>as required</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

*Risk of damage of the adapters!*

To avoid damages, only use grind clamping jaws, aluminium clamping jaws or special tools to clamp the adapters.

**Removing the Adapter, Rotor and Spacer**

1. Clamp the right adapter (fig.4.6/8) into a vice.
2. Pull off the wheel, respectively the hub. Take care that the rotor (fig.4.6/7) does not fall off.
3. Clamp the left adapter (fig.4.6/1) into a vice.
4. Pull off the wheel, respectively the hub.
5. Pull the rotor (fig.4.6/7) off the hub.

6. Pull the spacer (fig.4.6/6) off the axle.

Removing Pawls, Spring and Rotor Sealing

1. Remove the spring using a small, flat screwdriver.
2. Remove the pawls.
3. Remove the rotor sealing.
4. Check the sealing. Change a broken sealing.
Cleaning and Checking the Parts

1. Clean all parts of the hub (see Cleaning, p.6).
2. Check all parts for wear and damages.
3. Check the bearings.
   If the hub doesn’t turn smoothly, change the bearings (see Technical Manual at www.dtswiss.com).
4. Check the rotor for damages.
   Grooves from the cassette are no damages. These are normal signs of usage.
5. Remove bad notches from the rotor using a file.
6. Clean the rotor. Metal filings must be removed completely.

Mounting the Pawls, the Spring and the Rotor Sealing

1. Mount the rotor sealing.
2. Slightly grease the rotor (fig. 4.6/7) and the rotor sealing.

3. Mount the pawls. 
   Grease the pawls generously. This way, the pawls stuck in the correct position.

4. Mount the spring. 
   The open end of the spring must be positioned at the pin.

5. Slightly grease the pawls with multi purpose grease.
Mounting the Spacer, the Rotor and the Adapters

1. Grease the bearing and the axle.

2. Slide the spacer (fig.4.6/6) onto the axle.

3. Slide the rotor (fig.4.6/7) onto the hub while performing a rotary motion.
4. Check if the rotor can be turned easily and if the pawls lock.

5. Grease the bearings and the inner surface of both adapters (fig.4.6/1, 8).
6. Put on both adapters (fig.4.6/1, 8) and push them in by hand.

Caution: The shorter adapter must be attached on the drive side.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mount the cassette.</td>
<td>see instructions of the manufacturer</td>
</tr>
</tbody>
</table>
5 Maintenance of the Wheel

This chapter describes activities which are concerning the whole wheel:

- Truing the wheel
- Changing of a single spoke
- Rebuilding the wheel

The following periodic maintenance is recommended by DT Swiss:

<table>
<thead>
<tr>
<th>Action</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check spoke tension, run-out and wear of the wheel.</td>
<td>10 hours of use</td>
</tr>
<tr>
<td>Check the wheel for damages.</td>
<td>before and after each ride</td>
</tr>
<tr>
<td>Clean the wheel with a soft cloth and an appropriate cleaner. Do not use high pressure cleaners and aggressive cleaners!</td>
<td>after each ride</td>
</tr>
<tr>
<td>Check the proper fixation of the wheel.</td>
<td>before each ride</td>
</tr>
</tbody>
</table>

Wheels for rim brakes:

- Remove any contaminations (especially oil and traces of grease) from the brake surfaces.
- Check the degree of wear of the brake pads.
- Remove any entrenched impurities (grit, swarf, etc.).
- Check the degree of wear of the rim brake surfaces. In case of any doubts or viewable wear, contact a skilled professional.

5.1 Safety

⚠️ DANGER

Danger to life due to incorrect maintenance or wrong spare parts!

Wrong maintenance, wrong assembly or wrong spare parts can lead to unpredictable errors.

- Maintenance must only be done by professionals.
- Only use original spare parts or spare parts released by DT Swiss.
- In case of any doubts, contact a DT Swiss service center.
5.2 Special Tools

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>spokey square</td>
</tr>
<tr>
<td>2*</td>
<td>spoke holder 1 - 1.3 mm</td>
</tr>
<tr>
<td></td>
<td>spoke holder NEW AERO</td>
</tr>
<tr>
<td>3*</td>
<td>spoke holder 0.8 -1 mm</td>
</tr>
<tr>
<td></td>
<td>spoke holder AEROLITE</td>
</tr>
<tr>
<td>4</td>
<td>nipple wrench hex</td>
</tr>
<tr>
<td>5</td>
<td>nipple wrench torx</td>
</tr>
<tr>
<td>6</td>
<td>spoke holder DT universal</td>
</tr>
<tr>
<td>7</td>
<td>tensiometer DT Tensio</td>
</tr>
<tr>
<td>8</td>
<td>screw clamp</td>
</tr>
<tr>
<td>9</td>
<td>axle holder Park Tool</td>
</tr>
</tbody>
</table>

* These tools are available as new and old versions. Both version can be used for works on the wheels. In the figures of the following work instructions only the old versions are used.
5.3 Truing the Wheel

Preparatory Steps

Dismount the wheel.

Dismount the tire and if necessary the tube and the rim tape.

**NOTE**

Functional impairment / risk of damage due to wrong tools!

Only use the special tools intended for SPLINE® wheels (see chap.5.2, p.49).

1. Fix the wheel in the truing stand.
2. Check the radial and axial run out.

**NOTE**

Risk of damage to the bladed spokes and the nipples!

- Bladed spokes must be hold with the spoke holder while turning the nipple.
- Whenever possible there should be used the universal spoke holder (see chap.5.2, p.49) to avoid damages to the spokes. The spoke holder made out of metal (see chap.5.2, p.49) should only be used if the universal spoke holder can’t be used due to the high torque.
- There are used different spokes types (see chap.6.1, p.74). Ensure that the correct tool is being used.
- To avoid damages to the spoke, slide the spoke holder as far as possible in direction of the rim.
- To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.
3. Slide the nipple wrench onto the nipple. To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.

Wheels with bladed spokes:

4. Slide the spoke holder onto the spoke. To avoid damages of the spoke, slide the spoke holder as far as possible into the nipple wrench.
5. Align the spoke.

6. True the wheel.

SPLINE® wheels should be distressed minimum four times during the building process. First time at approximately 50% of the maximum spoke tension (see chap.6.1, p.74). After finishing truing, the wheel should be distressed once again. There should be no more changes in the settings (spoke tension, radial and axial run out).

After distressing the wheel should be within the limits shown in chap.6.2, p.74.

7. Check the radial and axial run out again. Repeat last steps if necessary.
8. Check the spoke tension (see chap.6.1, p.74) and increase or decrease it.
9. Check the radial and axial run out again. Repeat last steps if necessary.

Closing Steps

Mount tire and if necessary rim tape and tube.

Mount the wheel if necessary.
5.4 Changing a Single Spoke [MTB]

Preparatory Steps

- Dismount the wheel.
- Dismount the tire and if necessary the tube and the rim tape.
- Clean the wheel and check for damages.

If four or more spokes have to be replaced, the whole wheel should be rebuild.

**NOTE**

**Risk of damage to the bladed spokes and the nipples!**

- Bladed spokes must be hold with the spoke holder while turning the nipple.
- Whenever possible there should be used the universal spoke holder (see chap.5.2, p.49) to avoid damages to the spokes. The spoke holder made out of metal (see chap.5.2, p.49) should only be used if the universal spoke holder can’t be used due to the high torque.
- There are used different spokes types (see chap.6.1, p.74). Ensure that the correct tool is being used.
- To avoid damages to the spoke, slide the spoke holder as far as possible in direction of the rim.
- To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.

Removing the Spoke to be Replaced

1. Put the wheel into the truing stand.
2. If necessary, cut the spoke:
   a) Release the spoke using a screw clamp.
   b) Cut the spoke.
   c) Take off the screw clamp.

3. Check if there is a washer (PHR washer) on the nipple.
4. Take the spoke with the nipple out of the rim.
   If there is a PHR washer: Take care that the washer does not fall into the rim profile.

Only for spokes in the inner spoke holes of the hub flange.

5. Fully loosen the spoke (green) opposite the spoke head of the spoke (red) that needs to be replaced.
   Caution: The figure shows a wheel with bladed spokes.
Only for spokes in the inner spoke holes of the hub flange.

6. Put the spoke (green) opposite the head of the spoke (red) that needs to be replaced into the middle of the spoke tree.

**NOTE**

Risk of damages to the spoke and the hub!

Take care not to damage the paint of the spoke and the hub while removing the spoke.

Only for spokes in the inner spoke holes of the hub flange.

7. Push the green spoke beside and slide out the spoke that needs to be replaced (red).

8. Remove the spoke.
**Attaching a New Spoke [Conventional SPLINE® Wheels]**

For attaching a new spoke on a SPLINE ONE wheel, see [Attaching a New Spoke [SPLINE ONE]].

1. Slide the new spoke through the spoke hole. Push the opposite spoke beside slightly.

2. Screw on a new nipple.
   
   Caution: The figure shows a wheel with bladed spokes.

3. Tighten the changed and the loosened spoke.
   
   Caution: The figure shows a wheel with bladed spokes.
Attaching a New Spoke [SPLINE ONE]

For attaching a new spoke on a conventional SPLINE® wheel, see Attaching a New Spoke [Conventional SPLINE® Wheels].

**NOTE**

**Caution!**

SPLINE ONE wheels must only be build with DT Swiss Squorx nipples and special washers (PHR washers).

1. Grease the contact surface of the PHR washer and the Squorx nipple.

2. Slide the PHR washer onto the nipple.

3. Put the spoke through the hub.
4. Screw the Squorx nipple onto the spoke.
5. Check, if the PHR-washer is positioned correctly and fits correctly within the radius of the rim.
6. Screw the Squorx nipple onto the spoke until the thread disappears.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>True the wheel.</td>
<td>chap.5.3, p.50</td>
</tr>
<tr>
<td>Mount tire and if necessary rim tape and tube or</td>
<td></td>
</tr>
<tr>
<td>tubeless system.</td>
<td></td>
</tr>
<tr>
<td>Mount the wheel if necessary.</td>
<td></td>
</tr>
</tbody>
</table>
5.5 Changing a Single Spoke [ROAD]

### NOTE

**Risk of damage to the bladed spokes and the nipples!**
- Bladed spokes must be held with the spoke holder while turning the nipple.
- Whenever possible, there should be used the universal spoke holder (see chap. 5.2, p.49) to avoid damages to the spokes. The spoke holder made out of metal (see chap. 5.2, p.49) should only be used if the universal spoke holder can’t be used due to the high torque.
- There are used different spokes types (see chap. 6.1, p.74). Ensure that the correct tool is being used.
- To avoid damages to the spoke, slide the spoke holder as far as possible in direction of the rim.
- To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.

If four or more spokes have to be replaced, the whole wheel should be rebuilt.

#### 5.5.1 Loosening the Spoke

**Preparatory Steps**

Dismount the wheel.

Dismount the tire and if necessary the tube and the rim tape.

Clean the wheel and check for damages.

### NOTE

**Caution!**

Normally, the spoke has to be replaced because it is broken. If the spoke to be replaced is still intact, it can be cut using a cutter or s.th. similar.

1. If necessary, cut the spoke:
   a) Release the spoke using a screw clamp.
   b) Cut the spoke.
   c) Take off the screw clamp.
2. If necessary, loosen the spoke by hand.
   a) Slide the spoke holder onto the spoke.
   b) Unscrew the nipple using the nipple wrench.
      Take care that the nipple does not fall into the rim profile.

### Closing Steps

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the spoke.</td>
<td>see following</td>
</tr>
</tbody>
</table>
### 5.5.2 Changing a Single Spoke on the Front Wheel [Slotted Hub]

#### Preparatory Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dismount the wheel.</td>
<td></td>
</tr>
<tr>
<td>Dismount the tire and if necessary the tube and the rim tape.</td>
<td></td>
</tr>
<tr>
<td>Clean the wheel and check for damages.</td>
<td></td>
</tr>
<tr>
<td>Loosen the spoke.</td>
<td>chap. 5.5.1, p. 58</td>
</tr>
</tbody>
</table>

1. Take off the adapter by hand.

2. Slide the spoke with the nipple out of the rim.

3. Take the other end of the spoke out of the hub.
4. Put on a new spoke.
5. Screw on a new nipple.
6. Tighten the spoke.

7. Check the bearing: Clean and grease the bearing if it is badly soiled.
8. Put on the adapter.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>True the wheel.</td>
<td>chap.5.3, p.50</td>
</tr>
<tr>
<td>Mount tire and if necessary rim tape and tube.</td>
<td></td>
</tr>
<tr>
<td>Mount the wheel if necessary.</td>
<td></td>
</tr>
</tbody>
</table>
5.5.3 Removing a Single Spoke on the Front Wheel [Non-Slotted Hub]

Preparatory Steps

<table>
<thead>
<tr>
<th>Activity</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dismount the wheel.</td>
<td></td>
</tr>
<tr>
<td>Dismount the tire and if necessary the tube and the rim tape.</td>
<td></td>
</tr>
<tr>
<td>Clean the wheel and check for damages.</td>
<td></td>
</tr>
<tr>
<td>Loosen the spoke.</td>
<td>chap.5.5.1, p.58</td>
</tr>
</tbody>
</table>

1. Remove the adapter.
   a) Put the axle holder (see chap.5.2, p.49) into a vice.
   b) Clamp the adapter on the side of the spoke which needs to be replaced into the axle holder.
   c) Pull the wheel upwards using both hands.
   d) Remove the adapter from the vice.

2. Slide the spoke with the nipple out of the rim.

3. Slide the spoke out of the hub.

4. Slide a new spoke through the hub.
5. Screw on a new nipple.
6. Tighten the spoke.

7. Check the bearing: Clean and grease the bearing if it is badly soiled.
8. Put on the adapter.

Closing Steps | Link
--- | ---
True the wheel. | chap.5.3, p.50
Mount tire and if necessary rim tape and tube.
Mount the wheel if necessary.
5.5.4 Changing a Single Spoke on the Rear Wheel

Preparatory Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dismount the wheel.</td>
</tr>
<tr>
<td>2</td>
<td>Dismount the tire and if necessary the tube and the rim tape.</td>
</tr>
<tr>
<td>3</td>
<td>Clean the wheel and check for damages.</td>
</tr>
<tr>
<td>4</td>
<td>Loosen the spoke.</td>
</tr>
</tbody>
</table>

Removing the Spoke

1. Slide the spoke with the nipple out of the rim.

2. Only for spokes on the inner side of the hub: Pull the spoke over the spoke of the second crossing.
3. Slide the spoke through the hub and remove it.

Attaching a New Spoke

1. Slide a new spoke through the spoke hole of the hub.
2. Screw on a new nipple.
3. Tighten the spoke.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>True the wheel.</td>
<td>chap.5.3, p.50</td>
</tr>
<tr>
<td>Mount tire and if necessary rim tape and tube.</td>
<td></td>
</tr>
<tr>
<td>Mount the wheel if necessary.</td>
<td></td>
</tr>
</tbody>
</table>
5.6 Rebuilding the Wheel [ROAD]

Preparatory Steps

All spokes are available in the correct lengths.

5.6.1 Putting on the Spokes on the Front Wheel

1. Slide all spokes through the spoke holes on the first side of the hub.

2. Slide all spokes through the spoke holes on the second side of the hub.

3. Connect the «spoke tree» to the rim (see chap.5.6.3, p.68).
5.6.2 Putting on the Spokes on the Rear Wheel

General:
The crossing of the spokes must always be like shown in the picture.

1. Slide all spokes through the spoke holes on the first side of the hub.
   → For easier handling, first put the spokes into the inner side of the hub.

2. Slide all spokes through the spoke holes on the second side of the hub.
   → For easier handling, first put the spokes into the inner side of the hub.

3. Connect the «spoke tree» to the rim (see chap.5.6.3, p.68).
5.6.3 Connecting the «Spoke Tree» to the Rim

1. Position the «spoke tree» in the way that there is no spoke crossing above the valve hole.
   → Check the positioning of the stickers on the hub and on the rim.

2. Screw the nipple onto the spoke until the thread disappears.
3. Repeat step on all spokes.

**NOTE**

**Risk of damage to the bladed spokes and the nipples!**

- Bladed spokes must be hold with the spoke holder while turning the nipple.
- Whenever possible there should be used the universal spoke holder (see chap. 5.2, p.49) to avoid damages to the spokes. The spoke holder made out of metal (see chap. 5.2, p.49) should only be used if the universal spoke holder can’t be used due to the high torque.
- There are used different spokes types (see chap. 6.1, p.74). Ensure that the correct tool is being used.
- To avoid damages to the spoke, slide the spoke holder as far as possible in direction of the rim.
- To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.
**Increasing the Spoke Tension**

1. Increase the spoke tension (see chap.6.1, p.74) by using appropriate tools (see chap.5.2, p.49).

Caution: The figure shows a wheel with bladed spokes.

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>True the wheel.</td>
<td>chap.5.3, p.50</td>
</tr>
</tbody>
</table>
5.7 Rebuilding the Wheel [MTB]

Preparatory Steps

All spokes are available in the correct lengths.

Putting on the Spokes

General:
The crossing of the spokes must always be like shown in the picture.

1. Slide all spokes through the spoke holes on the first side of the hub.
   - For easier handling, first put the spokes into the inner side of the hub.

2. Slide all spokes through the spoke holes on the second side of the hub.
   - For easier handling, first put the spokes into the inner side of the hub.
3. Position the «spoke tree» in the way that there is no spoke crossing above the valve hole.
   > Check the positioning of the stickers on the hub and on the rim.

Putting on the Nipple [Conventional SPLINE® Wheels]

Attaching of a nipple on a SPLINE ONE Wheel, see Putting on the Nipple [SPLINE ONE Wheels].

**NOTE**

**Risk of damage to the bladed spokes and the nipples!**

- Bladed spokes must be hold with the spoke holder while turning the nipple.
- Whenever possible there should be used the universal spoke holder (see chap.5.2, p.49) to avoid damages to the spokes. The spoke holder made out of metal (see chap.5.2, p.49) should only be used if the universal spoke holder can’t be used due to the high torque.
- There are used different spokes types (see chap.6.1, p.74). Ensure that the correct tool is being used.
- To avoid damages to the spoke, slide the spoke holder as far as possible in direction of the rim.
- To avoid damages to the nipples, slide the nipple wrench as far as possible onto the nipple.

1. Screw the nipple onto the spoke until the thread disappears.
2. Repeat step on all spokes.

Caution: The figure shows a wheel with bladed spokes.
Putting on the Nipple [SPLINE ONE Wheels]
Attaching of a nipple on a conventional SPLINE wheel, see Putting on the Nipple [Conventional SPLINE® Wheels].

**NOTE**

*Caution!*
SPLINE ONE wheels must only be build with DT Swiss Squorx nipples and special washers (PHR washers).

1. Grease the contact surface of the PHR washer and the Squorx nipple.

2. Slide the PHR washer onto the nipple.

3. Put the spoke through the hub.
4. Screw the Squorx nipple onto the spoke.
5. Check, if the PHR washer is positioned correctly and fits correctly within the radius of the rim.
6. Screw the Squorx nipple onto the spoke until the thread disappears.

Increasing the Spoke Tension

1. Increase the spoke tension (see chap. 6.1, p. 74) by using appropriate tools (see chap. 5.2, p. 49).

Caution: The figure shows a wheel with bladed spokes.

Closing Steps Link

| True the wheel. | chap. 5.3, p. 50 |
6 Technical Data

Further technical data, like spoke types, spoke lengths etc. can be found in the DT Swiss Techbook at www.dtswiss.com.

6.1 Spoke Tension

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FW</td>
<td>1200</td>
<td>950</td>
<td>1150 - 1000</td>
</tr>
<tr>
<td>RW</td>
<td>1300</td>
<td>1050</td>
<td>1250 - 1100</td>
</tr>
<tr>
<td>Rim Brake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FW</td>
<td>1000</td>
<td>800</td>
<td>950 - 850</td>
</tr>
<tr>
<td>RW</td>
<td>1300</td>
<td>1050</td>
<td>1250 - 1100</td>
</tr>
</tbody>
</table>

6.2 Tolerances

<table>
<thead>
<tr>
<th>Type of Wheel</th>
<th>Horizontal Run Out [mm]</th>
<th>Vertical Run Out [mm]</th>
<th>Off Center (Dish) [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROAD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RC</td>
<td>0.25</td>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>R</td>
<td>0.25</td>
<td>0.3</td>
<td>0.2</td>
</tr>
<tr>
<td>MTB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XRC</td>
<td>0.25</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>XR, XM, EX</td>
<td>0.25</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>X, M, E</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>