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1 General

Validity
This manual describes the component specified on the front page and the footer. It is valid for the construction level of the component on the 2015-07-25. Deviations are possible and all items are subject to technical changes.

Safety
The safety instructions are classified as follows:

⚠️ DANGER
...indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠️ CAUTION
...indicates a hazardous situation that, if not avoided, could result in a minor or moderate injury.

NOTICE
...indicates information considered important, but not hazard-related.

...characterizes further information, or information which supplement the respective steps.

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

Layout
The cover page and the footing provide 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 an A5 booklet. Only print this manual if electronic usage is not possible.
DT Swiss Manual Concept
The DT Swiss manuals are split into the following types of manuals:

- User Manual
  Information for the end user on how to install and use the component.
- Technical Manual
  Detailed information for the end user and the dealer on 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 begin with the table «Preparatory Steps» and end 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, it is a reference to a chapter. If the text is formatted black and underlined, it is a reference to a figure. After clicking you will be automatically redirected to the target of the reference.

Example: Click here: chap. 1, page 2 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. 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 recognized 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 nonexistent 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. Only cleaners which do not damage the components may be used. 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 tools must be in good order and condition. 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.

DT Swiss special tools are precision tools. Damage-free mounting and dismounting of the components can only be ensured, if the tools are working properly and if the conditions of the tools are perfect. Always keep the tools in their original packaging or adequate devices to save them from damages.

Expendable Material

If special materials like grease or oil are needed, they will be specified in the table «Required Material» at the beginning of a chapter. The symbol « ✕ » refers to the table «Required Material» in the respective steps.

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 electronic usage is not possible.

Disclaimer

The operations described in this manual should only be performed by experts. The user is liable for any damage or consequential damage 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.
## Conversion of the Hub

The hubs can be converted to the following axle versions:

### 3.1 CLASSIC Wheels 2014

<table>
<thead>
<tr>
<th>Front Wheel Option</th>
<th>Link</th>
<th>Rear Wheel Option</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/100 mm QR</td>
<td>9/100 mm Thru Bolt</td>
<td>15/100 mm Thru Axle</td>
<td>20/110 mm Thru Axle</td>
</tr>
<tr>
<td>XRC 950 T</td>
<td>● ○</td>
<td>chap.3.3, p.9</td>
<td>● ○</td>
</tr>
<tr>
<td>XRC 950 T</td>
<td>○ ○ ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXC 1550</td>
<td>○ ○ ● / ○ • / ○</td>
<td>chap.3.3, p.9</td>
<td>○ • / ○ • / ○ • / ○</td>
</tr>
<tr>
<td>EX 1750</td>
<td>○ ○ ● / ○ • / ○</td>
<td>chap.3.3, p.9</td>
<td>• / ○ ○ ○ ○ / ○ / ○</td>
</tr>
</tbody>
</table>

- Standard ○ Option * Not convertible

### 3.2 CLASSIC Wheels 2015

<table>
<thead>
<tr>
<th>Front Wheel Option</th>
<th>Link</th>
<th>Rear Wheel Option</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/100 mm QR</td>
<td>9/100 mm Thru Bolt</td>
<td>15/100 mm Thru Axle</td>
<td>20/110 mm Thru Axle</td>
</tr>
<tr>
<td>XRC 950 T</td>
<td>● ○</td>
<td>chap.3.3, p.9</td>
<td>● ○</td>
</tr>
<tr>
<td>XRC 950 T</td>
<td>○ ○ ●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR 1950</td>
<td>○ ○ ● / ○ • / ○</td>
<td>chap.3.3, p.9</td>
<td>○ • / ○ • / ○ • / ○</td>
</tr>
</tbody>
</table>

- Standard ○ Option * Not convertible
### 3.3 Converting the Hub [Screwed on End Caps]

#### Preparatory Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove the brake disc.</td>
<td>see instructions of the manufacturer</td>
</tr>
<tr>
<td>Clean the hub.</td>
<td></td>
</tr>
</tbody>
</table>

#### Required Material

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT Swiss multipurpose grease</td>
<td>HXTXXX00NMG20S</td>
<td>as required</td>
</tr>
<tr>
<td>tool kit set front wheel oversize</td>
<td>HWTXXX00NTKFRS</td>
<td>1*</td>
</tr>
<tr>
<td>special textile fabric strap</td>
<td>HXTXXX00N5139S</td>
<td>1*</td>
</tr>
</tbody>
</table>

* Only required, if the end caps cannot be dismounted without dismounting the axle.
Removing the End Caps

1. Loosen the end caps (fig. 3-1/1) using a wrench and remove it from the axle.
   → 20 mm, 15 mm und 9 mm end caps: 22 mm open-end wrench
   → QR end caps: 5 mm Allen key

2. If the end caps cannot be loosened this way, the axle has to be dismounted (see following).

Dismounting the Axle

The axle only has to be dismounted, if the end caps cannot be dismounted like shown in the previous section.

1. Slide the disassembly tool onto the axle (fig. 3-1/3).
   Required material. see table on page 9.

2. Tap the bearing (fig. 3-1/2) and the axle out of the hub shell using the disassembly tool and a hammer.
3. Clamp the axle with the special strap into the vise.

   Required material, see table on page 9.

4. Unscrew the end cap and remove it.
   - 20 mm, 15 mm und 9 mm end caps: 22 mm open-end wrench
   - QR end caps: 5 mm Allen key

5. Remove the bearing from the axle.

Assembling Bearings and Axle

1. Slightly grease the seating of the bearings and the inner surface of the hub shell using multipurpose grease.
2. Put the axle (fig. 3-1/3) onto the mounting tool. Required material, see table on page 9.

3. Put the non disc side of the hub shell onto the tool and the axle.

4. Slightly grease the bearing (fig. 3-1/2) and put it onto the disc side with the colored side facing outwards.

5. Put the dismounting tool onto the axle.

6. Put the mounting tool onto the bearing.
   - The dismounting tool centers the mounting tool on the axle.
   - Required material. see table on page 9.

7. Tap the bearing into the hub shell with slight hammer strokes.
   - The lower mounting tool must lay on an even surface.

8. Remove the tool from the hub.
9. Check the bearing.
   → The hub must turn smoothly.
   → The hub must not have axial play.

10. If necessary, tap in the bearing on the non disc side or loosen the bearing.

11. Repeat previous steps until the hub is turning smoothly.

Putting on the End Caps

1. Grease the bearings and the inner surface of both end caps (fig. 3-1/1).

2. Screw on both end caps (fig. 3-1/1) by hand.

3. Tighten the end cap (fig. 3-1/1) with 15 Nm using a wrench.
   → 20 mm, 15 mm und 9 mm end caps: 22 mm open-end wrench
   → QR end caps: 5 mm Allen key

Closing Steps | Link
--- | ---
Mount the brake disc. | see instructions of the manufacturer
3.4 Converting the Hub [Inserted End Caps]

Preparatory Steps

<table>
<thead>
<tr>
<th>Preparatory Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear wheel: Remove the cassette if necessary.</td>
<td>see instructions of</td>
</tr>
<tr>
<td>Remove the brake disc.</td>
<td>the manufacturer</td>
</tr>
<tr>
<td>Clean the hub.</td>
<td></td>
</tr>
</tbody>
</table>

-required material specification amount

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>DT Swiss multipurpose grease</td>
<td>HXTXXX00NMG20S</td>
<td>as required</td>
</tr>
</tbody>
</table>

**NOTICE**

Risk of damaging the end caps!

To avoid damages, only use grind clamping jaws, aluminum clamping jaws or special tools to clamp the end caps.

For simplification, the conversion of the hubs is only shown with a rear wheel QR hub. The following actions are valid all axle version of front an rear wheel hubs with inserted end caps.

Removing the End Caps

1. Clamp the left end cap into a vise.
2. Pull the hub or the wheel upwards.
3. Clamp the right end cap into a vise.
4. Pull the hub or the wheel upwards.
Cleaning and Greasing the End Caps

1. Clean both end caps and the accessible parts of the hub with a dry cloth.
2. Grease both bearings and the contact surface of the end caps.
   \[\text{Required material, see table on page 14.}\]

Putting on the End Caps

1. Put both end caps onto the hub by hand.
   Note: The short end cap must be placed on the drive side.

Closing Steps

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear wheel: Mount the cassette if necessary.</td>
<td>see instructions of the manufacturer</td>
</tr>
<tr>
<td>Mount the brake disc.</td>
<td></td>
</tr>
</tbody>
</table>
4 Maintenance of the Hub

This chapter describes a small hub service. It includes:

- Rotor: Dismounting, cleaning, greasing and re-mounting
- Freewheel system: Cleaning and greasing

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

4.1 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>
<tbody>
<tr>
<td>Small service (see following)</td>
<td></td>
</tr>
<tr>
<td>• normal operating conditions</td>
<td>6 months</td>
</tr>
<tr>
<td>• extreme operating conditions</td>
<td>as required</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Big service (see Technical Manual at <a href="http://www.dtswiss.com">www.dtswiss.com</a>)</td>
<td></td>
</tr>
<tr>
<td>• normal operating conditions</td>
<td>12 months</td>
</tr>
<tr>
<td>• extreme operating conditions</td>
<td>as required</td>
</tr>
<tr>
<td>Check the hub for damages.</td>
<td>before and after each ride</td>
</tr>
<tr>
<td>Cleaning with a soft sponge and an</td>
<td>after each ride</td>
</tr>
<tr>
<td>appropriate cleaner (see section</td>
<td></td>
</tr>
<tr>
<td>„Cleaning“, page 5)</td>
<td></td>
</tr>
<tr>
<td>Do not use high pressure cleaners or aggressive cleaners.</td>
<td></td>
</tr>
</tbody>
</table>

4.2 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.
### 4.3 Maintenance of the Rear Wheel Hub [Ratchet System]

![Figure 4-1: Overview: Ratchet System](image)

**Preparatory Steps**
- Remove the cassette. see instructions of the manufacturer
- Remove the brake disc.
- Clean the hub.

<table>
<thead>
<tr>
<th><strong>Required Material</strong></th>
<th><strong>Specification</strong></th>
<th><strong>Amount</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>DT Swiss multipurpose grease</td>
<td>HXTXXX00NMG20S</td>
<td>as required</td>
</tr>
<tr>
<td>DT Swiss special grease for ratchet system</td>
<td>HXTXXX00NSG20S</td>
<td>as required</td>
</tr>
</tbody>
</table>

**NOTICE**

Risk of damaging the end caps!
To avoid damages, only use grind clamping jaws, aluminum clamping jaws or special tools to clamp the end caps.
Removing End Caps, Rotor and the Ratchet System

1. Clamp the left end cap (fig. 4-1/1) into a vise.
2. Pull off the wheel, respectively the hub.
3. Clamp the left end cap (fig. 4-1/13) into a vise.
4. Pull off the wheel, respectively the hub. Take care that the rotor does not fall off.
5. Pull the rotor (fig. 4-1/12) off the hub.
6. Take the springs (fig. 4-1/10), the star ratchet (fig. 4-1/11) and the spacer (fig. 4-1/9) off the hub.
Cleaning and Checking the Parts

1. Clean all parts of the hub (see section „Cleaning“, page 5).
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.
   Required material, see table on page 17.
2. Put on the spacer (fig. 4-1/9) and the first spring (fig. 4-1/10).
   The big diameter of the spring must be placed on the bearing of the hub.
3. Put on both star ratchets (fig. 4-1/11) and the second spring (fig. 4-1/10). The small diameter of the spring must be placed on the star ratchet.

Putting on the Rotor and the End Caps

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 end caps (fig. 4-1/1/13).

Required material, see table on page 17.

4. Put both end caps (fig. 4-1/1/13) onto the hub by hand.

Note: The short end cap must be placed 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>
<tr>
<td>Mount the brake disc.</td>
<td></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.</td>
<td>after each ride</td>
</tr>
<tr>
<td>Do not use high pressure cleaners and aggressive cleaners!</td>
<td></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 Truing the Wheel

Preparatory Steps

Dismount the wheel.

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

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>spokey square</td>
<td>TTSXXXXR056335</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench hex</td>
<td>TTSXXXXB056325</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench Torx</td>
<td>TTSXXXXS056305</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>tensiometer DT tensio analog</td>
<td>TETTAXXR055005</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTICE**

Functional impairment / risk of damage due to wrong tools!

Only use the special tools intended for DT Swiss wheels.

1. Fix the wheel in the truing stand.
2. Check the radial and axial run out.
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.
   ➔ Required material, see table on page 23.

4. True the wheel.

   DT Swiss 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, page 70).
   After finishing trueing, 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, page 70.

5. Check the radial and axial run out again. Repeat last steps if necessary.
6. Check the spoke tension (see chap. 6.1, page 70) and increase or decrease it.
7. 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.
### 5.3 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.

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>spokey square</td>
<td>TTSXXXXR05633S</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench hex</td>
<td>TTSXXXXB05632S</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench Torx</td>
<td>TTSXXXXS05630S</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>screw clamp</td>
<td></td>
<td>1 (if required)</td>
</tr>
</tbody>
</table>

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

**Removing the Spoke to be Replaced**

1. Put the wheel into the truing stand.
The following steps are based on a broken spoke. If the spoke is not broken, but damaged, it can be cut with a wire cutter or something similar.

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. Take the first piece of the spoke with the nipple out of the rim.

4. Remove the second piece of the spoke from the hub.
Put on a new Spoke

1. Slide the new spoke through the spoke hole.
2. Put on a new 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.
   ❗️ Required material, see table on page 25.
4. Tighten the spoke.

Closing Steps

<table>
<thead>
<tr>
<th>Closing Steps</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>True the wheel.</td>
<td>chap. 5.3, page 46</td>
</tr>
<tr>
<td>Mount tire and if necessary rim tape and tube or tubeless system.</td>
<td></td>
</tr>
<tr>
<td>Mount the wheel if necessary.</td>
<td></td>
</tr>
</tbody>
</table>
5.4 Rebuilding the Wheel

**Preparatory Steps**

All spokes are available in the correct lengths.

<table>
<thead>
<tr>
<th>Required Material</th>
<th>Specification</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>spokey square</td>
<td>TTSXXXXXR056335</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench hex</td>
<td>TTSXXXXB056325</td>
<td>1 (if required)</td>
</tr>
<tr>
<td>nipple wrench Torx</td>
<td>TTSXXXXS05630S</td>
<td>1 (if required)</td>
</tr>
</tbody>
</table>

The spoking of the wheel must follow the common procedure of spoking a classic, 3x crossed wheel. DT Swiss recommends the reference book «The Art of Wheelbuilding» by Gerd Schraner (ISBN 0964983532).

**Closing Steps**

True the wheel. [chap. 5.3, page 46]
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>Max. Tolerated Spoke Tension of the Higher Tightened Wheel Side</th>
<th>Min. Tolerated Spoke Tension of the Higher Tightened Wheel Side</th>
<th>Average Spoke Tension of the Higher Tightened Wheel Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc Brake</td>
<td>[N]</td>
<td>[N]</td>
<td>[N]</td>
</tr>
<tr>
<td>FW</td>
<td>1 200</td>
<td>950</td>
<td>1 150 - 1 000</td>
</tr>
<tr>
<td>RW</td>
<td>1 300</td>
<td>1 050</td>
<td>1 250 - 1 100</td>
</tr>
<tr>
<td>Rim Brake</td>
<td>[N]</td>
<td>[N]</td>
<td>[N]</td>
</tr>
<tr>
<td>FW</td>
<td>1 000</td>
<td>800</td>
<td>950 - 850</td>
</tr>
<tr>
<td>RW</td>
<td>1 300</td>
<td>1 050</td>
<td>1 250 - 1 100</td>
</tr>
</tbody>
</table>

6.2 Tolerances

<table>
<thead>
<tr>
<th>Type of Wheel</th>
<th>Horizontal Run Out</th>
<th>Vertical Run Out</th>
<th>Off Center (Dish)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[mm]</td>
<td>[mm]</td>
<td>[mm]</td>
</tr>
<tr>
<td>XRC, EXC</td>
<td>0.25</td>
<td>0.5</td>
<td>0.3</td>
</tr>
<tr>
<td>EX, FR</td>
<td>0.25</td>
<td>0.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>