

KiNDERnAy



# **KINDERNAY SWAP**

## **WHEELBUILDING GUIDELINE**

**28H, 32H & 36H**

Ver 1.0.4

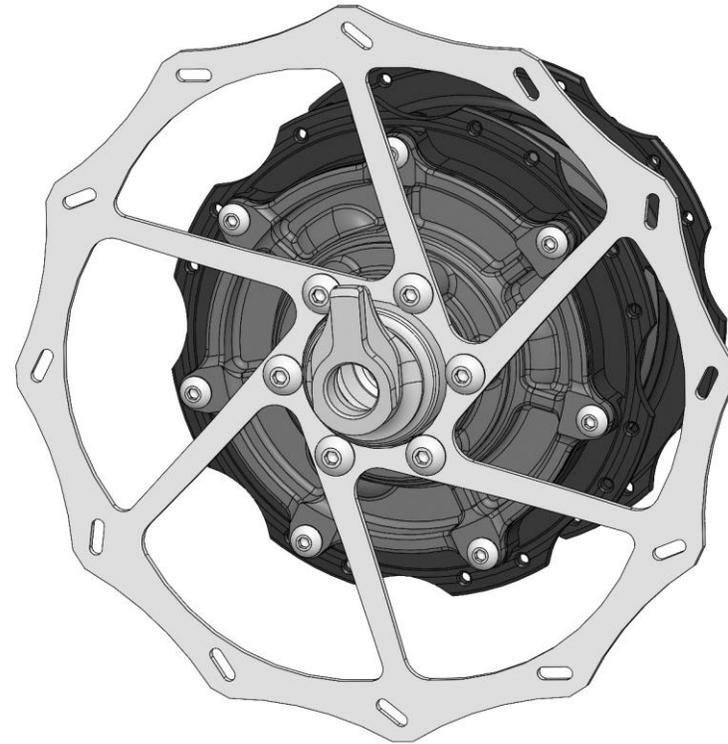
# DISCLAIMER

- ! **EXTREMELY IMPORTANT:** The SWAP cage must be laced according to the procedure on page 10-13.
  - ! Failure to follow the lacing pattern will void the warranty.
- ! Improper installation can cause serious bike malfunction that may lead to serious injury or death!
- ! This is not a complete guide to wheelbuilding!
  - ! For more specific instructions on wheelbuilding techniques, refer to [Professional Guide to Wheel Building](#) by Roger Musson, or other relevant literature.
- ! The wheelbuilding procedure should only be performed by experienced mechanics.
  - ! This manual assumes basic understanding of wheel dynamics and wheelbuilding skills.
- ! The max. spoke tension for the 28h, 32h and 36h SWAP is 1200 N.
  - ! Always stay within the rim-manufacturers max. spoke tension limit (usually 1000-1200 N).
- ! We strongly recommend avoiding spokes thicker than 14G (2.0 mm).
  - ! Using thicker spokes will result in a less dynamic wheel, where spokes will loosen more easily.
  - ! We recommend using 1.5 to 1.8 double butted spokes with brass nipples.
- ! We strongly recommend using a thread locking compound on the nipples.
  - ! Linseed oil, Spoke freeze or low-strength Loctite are good alternatives.
- ! For smaller wheels (26" and below) we recommend using rims with angle-drilled holes.
  - ! Ryde Andra rims are recommended.

# SCOPE

This instruction is intended for professional and home mechanics to:

- Find product specifications for the Kindernay SWAP cages.
- Calculate spoke lengths for the SWAP cage / rim combination.
- Lace the wheel to a SWAP cage.
- Find guidance on the wheelbuilding process with a Kindernay SWAP cage.



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# TOOLS NEEDED

This is a list of tools that we recommend to lace and build the Kindernay SWAP wheel:

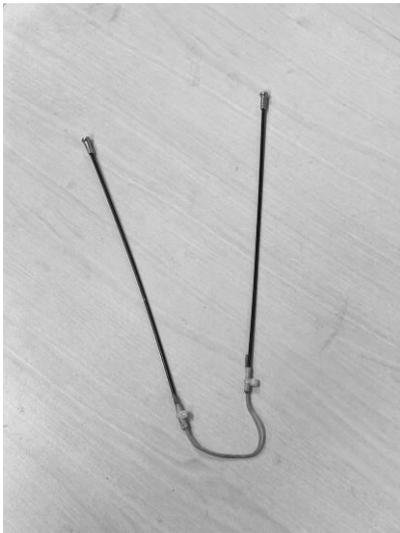
- Wheel truing stand
- Spoke wrench according to nipple type
- Spoke tensio-meter w/conversion table
- Oil for lubricating rim bead
  - Kindernay Velvet fluid, Motor oil, chain lubricant, etc.
- Thread locking compound, such as linseed oil
- Gloves for wheel de-stressing



# MEASURING RIM ERD

## NOTE !

It is recommended to measure the rim ERD with the spoke nipples intended for the build, as the manufacturer specification often is inaccurate.



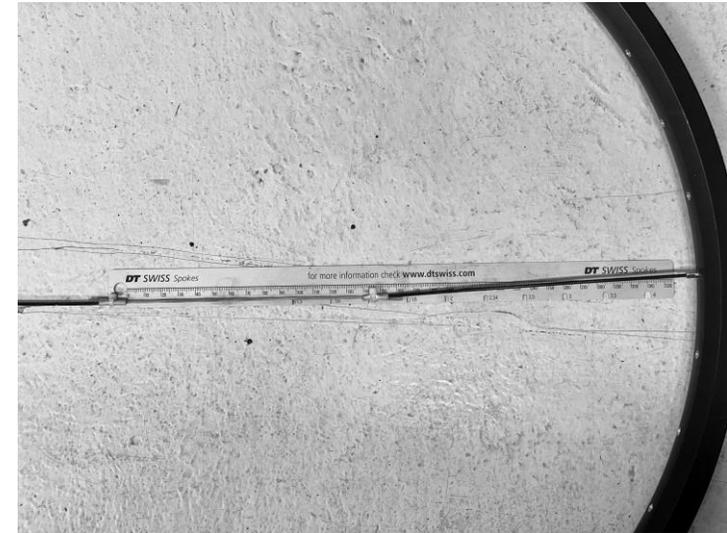
1.1: Cut two spokes to exactly 200 mm and attach them with a rubber band.



1.2: Install the spokes in two co-axial holes (180 deg. from each other).



1.3: Tighten the nipple such that the spoke is flush with bottom of the nipple slot.



1.4: Measure using a ruler and add the lengths together to obtain the ERD.

Example:  $ERD = 200 * 2 + 134 = 534 \text{ mm}$

# CALCULATING SPOKE LENGTHS

## NOTE !

Due to the staggered spoke hole pattern on the SWAP cages, additional spoke length must be added on top of the calculated spoke length. Refer to the table below for specifics.

## NOTE !

We strongly recommend avoiding thicker spokes than 14G (2.0 mm). Using thicker spokes will result in a less dynamic wheel, where spokes will loosen more easily.

The large diameter and symmetric hub flanges make the SWAP cage an ideal base for a strong and lightweight wheel. Wheel building on the Kindernay SWAP cage is straightforward, but there are a few things to be aware of, namely the extra spoke length vs. regular hubs, the specific lacing pattern and direction of the spokes exiting the cage.

The 28h, 32h and 36h SWAP cages have a staggered hole pattern. Refer to the table for recommended length additions.

PARAMETER	28H	32H	36H
Hub/flange diameter left side (mm)	100	110	110
Hub/flange diameter right side (mm)	100	110	110
Flange offset left side (mm)	28	25	25
Flange offset right side (mm)	28	25	25
Spoke hole diameter (mm)	2.6	2.6	2.6
Number of spokes	28	32	36
Spoke length, 2 cross lacing pattern	Add 2.5-	Add 2.0	Add 1.0-
Spoke length, 3 cross lacing pattern	3.0 mm	mm	1.5 mm
Recommended spoke diameter (elbow)	2.0	2.0	2.0
Recommended spoke diameter (mid section)	1.6	1.6	1.6
Max. recommended spoke dia. (mid section)	2.0 (14G)	2.0 (14G)	2.0 (14G)

We recommend the following spoke calculator: <https://www.wheelpro.co.uk/spokecalc/>

# PREPARATION TIPS

## NOTE !

The following tips will ease the wheelbuilding process.



**Spoke selection:** We recommend using 1.5 to 1.8 double butted spokes with brass nipples. Using thicker spokes will result in a less dynamic wheel, where spokes will loosen more easily.



**Rimbed lubrication:** We recommend lubricating the rimbed slightly with Kindernay Velvet fluid, motor oil or other similar lubricant. This will allow the nipple to rotate more easily during tensioning.



**Thread locker:** Using linseed oil will allow the nipples to rotate freely during tensioning, but seize up after a few days. This will reduce the likelihood of the nipples unwinding if the rim is damaged or bent.



**Lacing:** Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



**Tensioning:** Ensure even spoke tensions to maximize the longevity of the wheel components.

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# 2-CROSS LACING

**28H, 32H & 36H**

The lacing steps are identical for all SWAP cages.

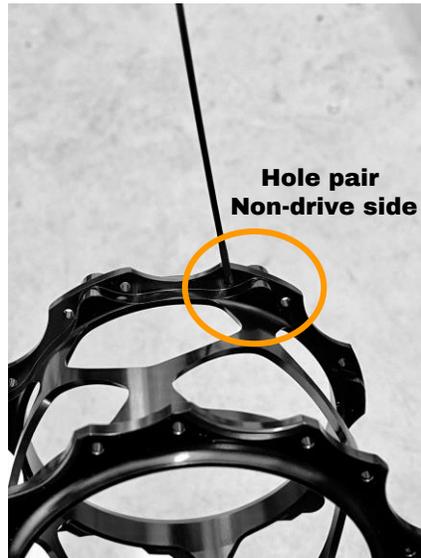
# 2C LACING – NON-DRIVE SIDE – TRAILING SPOKES

## CAUTION !

The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

The 28h, 32h and 36h SWAP cages have a staggered hole pattern. Pay attention to the hole stagger during the lacing procedure.



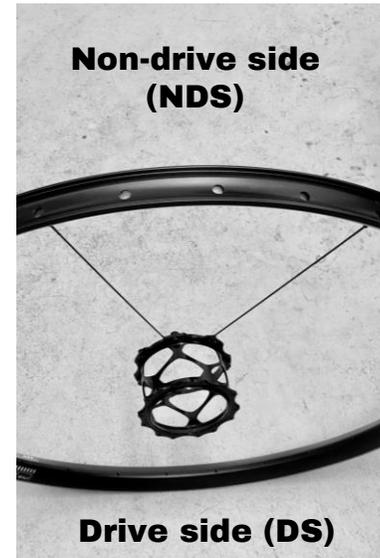
1.1: Insert a spoke in a non-drive side flange hole (the side with the threaded holes), through the left hole in the hole pair as seen from the drive side (as shown).



1.2: Pass the spoke through the spoke hole to the right of the valve hole.



1.3: Pick the second next hole in the NDS flange and insert a spoke as in step 1.1.



1.4: Attach the spoke from step 1.3 as shown, with 3 spoke holes in between.



1.5: Complete the remaining spokes in a similar manner. Rotate the SWAP cage counter-clockwise, as seen from NDS to take up the initial slack.

# 2C LACING – NON-DRIVE SIDE – LEADING SPOKES

## CAUTION !

Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

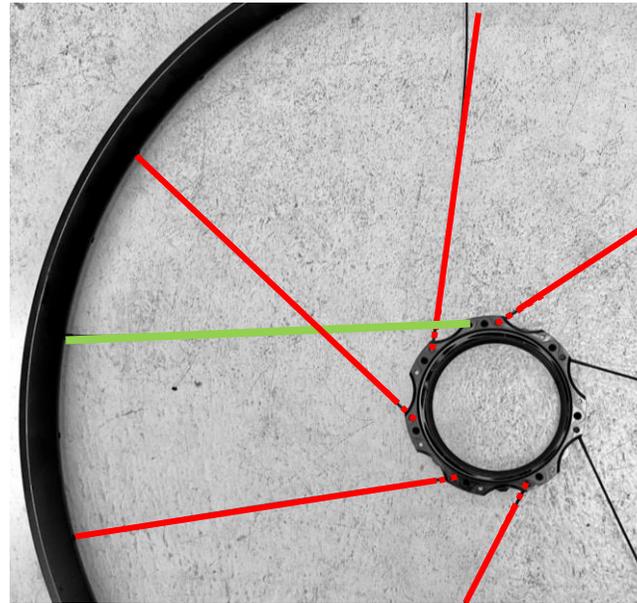
Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



2.1: Install a spoke in any of the remaining NDS flange holes, exiting on the outside of the flange.



2.2: Route the spoke over the first trailing spoke, and under the last trailing spoke.



2.3: The spoke should be routed as shown, with trailing spokes in red and leading spoke in green.



2.4: Repeat for the remaining spokes and complete the NDS lacing.

# 2C LACING – DRIVE SIDE – TRAILING SPOKES

## CAUTION !

The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

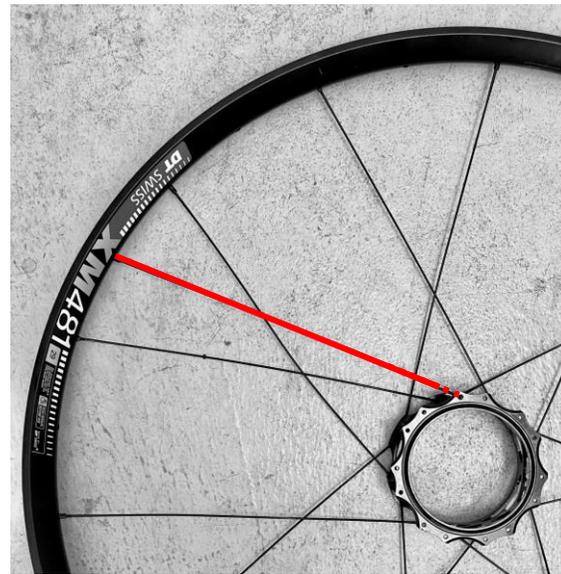
Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



3.1: Insert a spoke in any drive side flange hole to the right of a NDS trailing spoke, exiting on the inside of the flange.



3.2: Carefully maneuver the DS spoke between the NDS spokes. It is ok to bend the spoke slightly in this process.



3.3: The spoke should be routed as shown in red, entering the rim to the right of the NDS trailing spoke referenced in step 3.1.



3.4: Complete the remaining DS trailing spokes in the same manner.

# 2C LACING – DRIVE SIDE – LEADING SPOKES

## CAUTION !

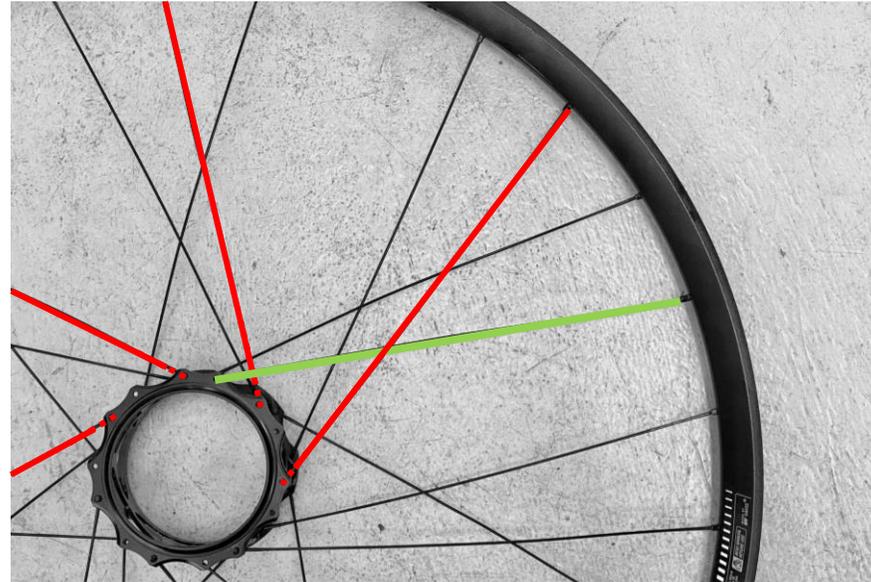
The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

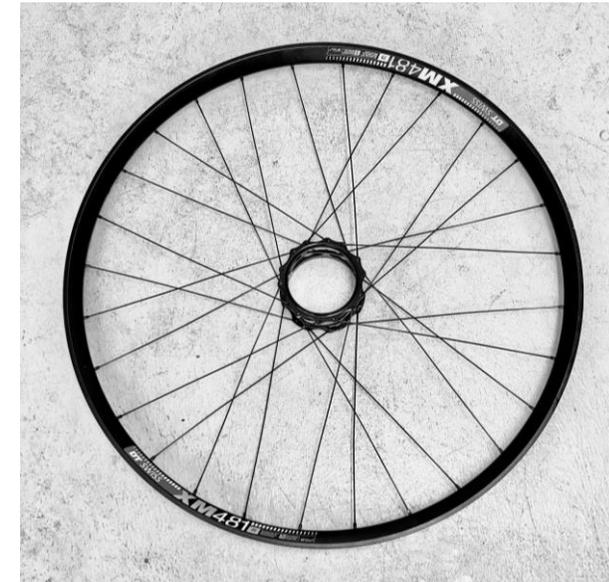
Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



4.1: Install a spoke in any of the remaining DS flange holes, exiting on the outside of the flange.



4.2: Route the spoke over the first trailing spoke, then under the last trailing spoke. The spoke should be routed as shown, with trailing spokes in red and leading spoke in green.



4.3: Repeat for the remaining spokes, completing the wheel lacing.



# **3-CROSS LACING**

**28H, 32H AND 36H**

The lacing steps are identical for all SWAP cages.

# 3C LACING – NON-DRIVE SIDE – TRAILING SPOKES

## CAUTION !

The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

The 28h, 32h and 36h SWAP cages have a staggered hole pattern. Pay attention to the hole stagger during the lacing procedure.



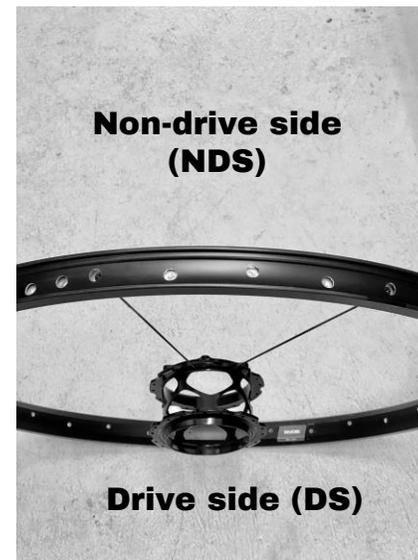
1.1: Insert a spoke in a non-drive side flange hole (the side with the threaded holes), through the left hole in the hole pair as seen from the drive side (as shown).



1.2: Pass the spoke through the spoke hole to the right of the valve hole.



1.3: Pick the second hole next in the NDS flange and insert a spoke as in step 1.1.



1.4: Attach the spoke from step 1.3 as shown, with 3 spoke holes in between.



1.5: Complete the remaining spokes in a similar manner. Rotate the SWAP cage counter-clockwise, as seen from NDS to take up the initial slack.

# 3C LACING – NON-DRIVE SIDE – LEADING SPOKES

## CAUTION !

Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

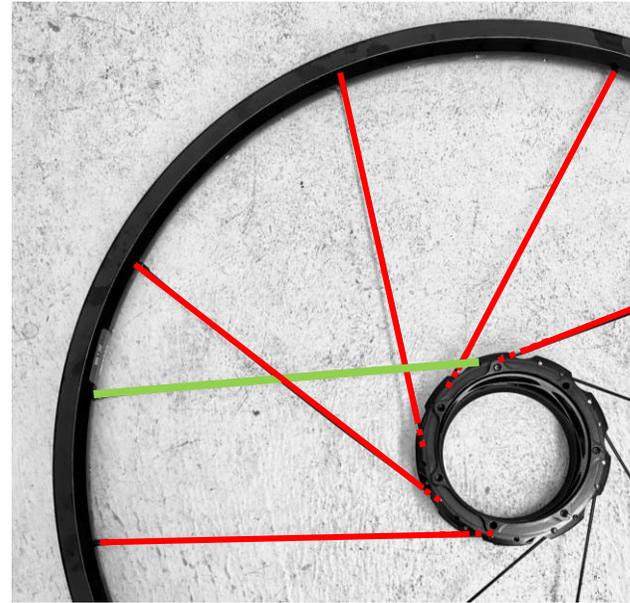
Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



2.1: Install a spoke in any of the remaining NDS flange holes, exiting on the outside of the flange.



2.2: Route the spoke over the two first trailing spokes, and under the last trailing spokes.



2.3: The spoke should be routed as shown, with trailing spokes in red and leading spoke in green.



2.4: Repeat for the remaining spokes and complete the NDS lacing.

# 3C LACING – DRIVE SIDE – TRAILING SPOKES

## CAUTION !

The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

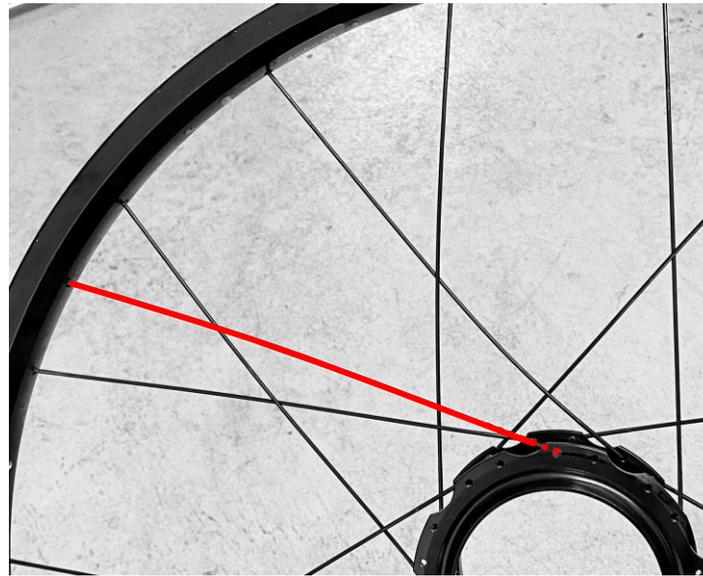
Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



**3.1:** Insert a spoke in any drive side flange hole to the right of a NDS trailing spoke, exiting on the inside of the flange.



**3.2:** Carefully maneuver the DS spoke between the NDS spokes. It is ok to bend the spoke slightly in this process.



**3.3:** The spoke should be routed as shown in red, entering the rim to the right of the NDS trailing spoke referenced in step 3.1.



**3.4:** Complete the remaining DS trailing spoke in the same manner.

# 3C LACING – DRIVE SIDE – LEADING SPOKES

## CAUTION !

The trailing spokes must be laced so that they exit on the inside of the hub flange. Failure to lace the wheel according the below instruction can cause wheel failure.

## NOTE !

Only tighten the nipples a few turns during lacing. This will make it easier to lace the remaining spokes.



4.1: Install a spoke in any of the remaining DS flange holes, exiting on the outside of the flange.



4.2: Route the spoke over the two first trailing spokes, and under the last trailing spoke. The spoke should be routed as shown, with trailing spokes in red and leading spoke in green.



4.3: Repeat for the remaining spokes, completing the wheel lacing.

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# **FINAL STEPS**

**28H, 32H AND 36H**

# TAKING UP THE SLACK

## NOTE !

Because of the large flange diameter on Kindernay SWAP, it is important to align the spokes after taking up the slack.



**5.1: (Optional)** Use a battery drill with a suitable spoke nipple bit to take up the initial slack. For most wheels, the limiter extension can be set to around 2-3 mm for the initial tensioning.



**5.2:** Align the leading spokes on NDS and DS flanges by pressing down on the spoke as shown. This is especially important for small wheels, as the large flange diameter gives large spoke angles. Otherwise, fatigue life will be reduced, and the spokes can loosen over time.



**5.3:** Take up the remaining slack using a spoke wrench.

# FINAL TENSIONING TIPS

## NOTE !

The SWAP cage has symmetric flanges, thus simplifying the truing process significantly if using a symmetric rim.

## NOTE !

Is important to destress the spokes several times during tensioning. This will ensure the nipple and spoke are properly seated in the rim and hub cage, respectively.



**Tensioning:** Be methodical in the tensioning process and pay attention to the spoke rotation to avoid spoke twist.



**De-stressing:** It is important to destress the spokes several times during tensioning. This will ensure the nipple and spoke are properly seated in the rim and SWAP cage, respectively.



**Wheel dish:** The wheel dish can be checked by installing a hub in the SWAP cage. Remember to also install the Match cap on the non-drive side and shifter actuator on the drive side, as shown.



**Spoke tension:** Regularly check the spoke tension. An evenly tensioned wheel will require little truing and re-dishing afterwards.

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Need support?

Contact our support team directly at

[support@kindernay.com](mailto:support@kindernay.com)



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