NORTH AMERICA BRAKE INDUSTRY

Hub & Rotor Service Manual

Trailer Hub & Disc Assemblies

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INTRODUCTION

This service manual was produced by HDNABI® and is applied to Air Disc Brake products for trailers.

Information relating to disc brake calipers, pads or other vehicle-related systems is not included in this manual. For information on other brake related parts, refer to the service manual produced by the vehicle or component manufacturer. Please read this manual carefully and follow the instructions.

Pay particular attention to all **NOTES, CAUTIONS, WARNINGS and DANGERS** to reduce the risk of injury or damage. HDNABI® cannot evaluate all methods of operation and the potential dangers of each method. Therefore, if you wish to use a procedure that is not recommended by HDNABI®, you should first make sure that the method you choose does not threaten the safety of yourself and the product.

NOTES BEFORE STARTING

1. Read all instructions and procedures before starting the service.
2. Read and follow all warning, caution, and danger messages in this manual. Provides information to help prevent serious injury, component damage, and more.
3. Follow your company's maintenance and service, installation, and diagnostics guidelines.
4. Use special tools if necessary to avoid serious injury or component damage.

HAZARD ALERT MASSAGES

Danger signals (such as warnings or cautions) appear in several places in this document and other HDNABI® publications. Always pay attention to the information highlighted by these signals.

⚠ DANGER

If DANGER is ignored, a dangerous situation arises that could result in death or serious injury.

⚠ WARNING

If WARNING is ignored, a dangerous situation arises that could result in death or serious injury.

⚠ CAUTION

If CAUTION is ignored, a dangerous situation arises that could result in death or serious injury.

⚠ NOTE

NOTE includes information available for reference during service.

HOW TO OBTAIN ADDITIONAL MAINTENACE AND SERVICE INFORMATION

On the Web: Visit www.hdnabi.com to access HDNABI's product, service and maintenance literature.
HDNABI® Customer Service: Call HDNABI's Customer Service at 1-888-693- 7073.

⚠ WARNING

Brake pads contain asbestos and non-asbestos materials that can be harmful to health. Follow the recommendations for service to avoid unnecessary contact with brake dust.

1. IDENTIFICATION

1.1 Wheel Hubs with HDNABI® Disc Brake

This manual contains general information about HDNABI® Hub & Rotor for Air Disc Brake application.

1.2 Identification

Before starting any service operation, you must first verify that the vehicle is equipped with a Rotor designed and manufactured by HDNABI®.

The HDNABI® Rotor can be identified by its part number.

The part number is engraved on the cast part as shown in (Figure 1.) or the machined part as shown in (Figure 2.).

FIGURE 1. Casting Disc Part Number

FIGURE 2. Machining Rotor Part Number

2. INSPECTION

2.1 Hazard Alert Messages

Read and follow all warning, caution, and danger messages in this section.
Provides information to help prevent serious injury, component damage, and more.

⚠**DANGER** To avoid eye injury, always wear safety glasses when performing vehicle maintenance or servicing. Do not work on vehicles supported only by jacks. Jack may slip, resulting in serious injury. Park your vehicle on a level surface. Secure the wheels to prevent the vehicle from moving.

⚠**WARNING** Some brake pads contain ingredients that pose a risk of cancer and lung disease. Be careful when handling asbestos and non-asbestos materials.

2.2 Disc Brake Inspection

Disc Brake component inspection is part of a pre-check and regular preventive maintenance procedure.

⚠**DANGER** The vehicle above the jack may fall and cause serious injury. Do not work under a vehicle supported only by jacks without the wheels secured. Wear safety goggles. Observe safety procedures before starting vehicle inspection.

1. Lift and support the axle from a secure stand.
2. Remove the wheel.
3. Rotate the Hub and inspect both sides of the Disc.

If any of the following conditions are found, follow the instructions to disassemble the Hub and replace the Disc.

2.3 Out of Service Conditions

2.3.1. Heat Checks

Heat checks occur due to repeated heating and cooling of the braking surface. Numerous light and heavy heat checks can occur on the braking surface.
(See Figure 3.) for Light heat check and (See Figure 4.) for Heavy heat check.

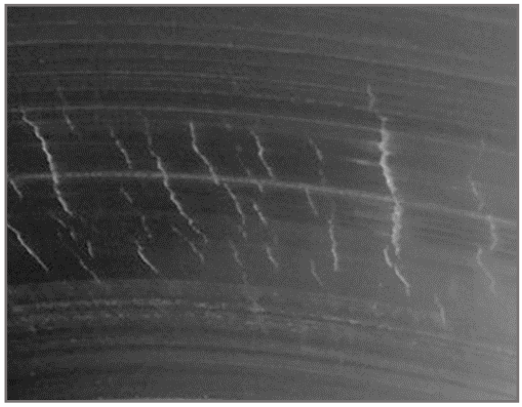


FIGURE 3. Light Heat Check

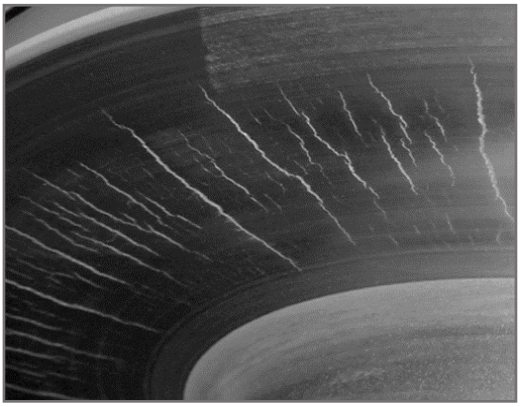


FIGURE 4. Heavy Heat Check

2.3.2 Cracks

Heat checks can wear out and eventually cracks on the braking surface. If cracks are more than 0.060" wide and extend more than 75% of the braking surface in the radial direction, the Disc must be replaced.

Cracked Rotor can lead to mishandling, brake balance issues, wear beyond the minimum allowable thickness, or driver abuse. If cracks expand or are found in the Rotor mount, the Disc needs to be replaced. Shows the Disc that needs to be replaced. (See Figure 5.)
The cracks in (See Figure 6.) are acceptable, but the Disc should be inspected regularly to see if the cracks expand.

FIGURE 5. Unacceptable Crack

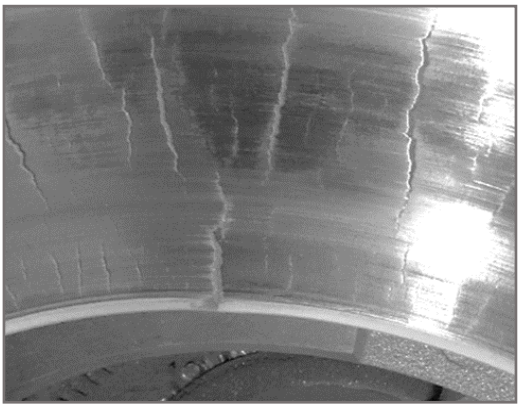


FIGURE 6. Acceptable Crack

2.3.3 Deep Grooves or Scoring

Grooves or scoring can be caused by contaminants accumulated between Pad and Rotor, worn Pad, etc.
Rotor's Grooves or scoring are acceptable for depths less than 0.060" when measuring the thickness of the Rotor with the grooves surface, if so, the Rotor needs to be replaced. (See Figure 7.) for grooves on the Rotor surface.

FIGURE 7. Grooves on Brake Surface

2.3.4 Blue marks or Bands

If the Rotor becomes extremely hot, blue marks or bands may appear on the surface. (See Figure 8.) for an example of these marks. This condition can lead to persistent hard stops, improper brake balance, brake caliper clearance, operation, or adjustment. The cause of overheating must be identified and corrected. If the Rotor in the above condition has adequate runout and thickness, it does not need to be replaced.

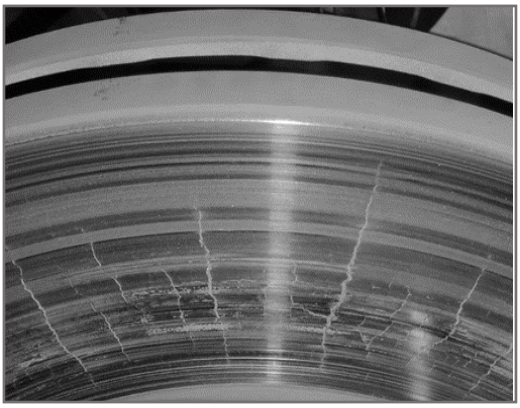


FIGURE 8. Blue Marks

2.3.5 Polished Rotors

A polished rotor will have a mirror-like finish on the braking surface. This condition may be caused by improper lining friction rating or a rotor resurfaced to too fine of a microfinish. (See Figure 9.)

To correct this condition, sand the braking surface on the rotor and the brake pads with 80 grit emery cloth. The microfinish should be 120 to 150 RMS. If the condition returns, verify that the linings on the brake pads have the correct friction rating for the application.

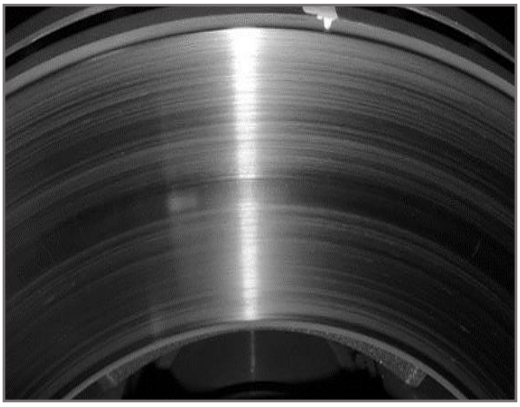


FIGURE 9. Polished Disc

2.3.6 Martensite Spotted Rotors

A Rotor that cools rapidly after being exposed to extremely high heat may indicate a Martensite Spotted condition. This condition indicates that the Rotor is brittle and is indicated by an identifiable black dot. (See Figure 10.)

High temperatures cause structural changes in the Rotor material. In this state, the Disc is more vulnerable to heat. The Rotor in this state should be replaced. Check the Pad for uneven wear and replace if necessary.

Brake drag and balance should be checked after replacing the Rotor and reinstalling the Hub and Rotor on the Axle.

FIGURE 10. Martensite Spotted Disc

2.3.7 Pad Transfer

High operating temperatures or improper pad material may cause the pad to move to the Disc Brake surface. (See Figure 11.)

This condition accelerates the wear of the pad. The displaced part can be removed by resurfacing the Rotor. Prior to reuse after removal, review of the pad material or high operating temperature that causes the pad transfer should be given priority.

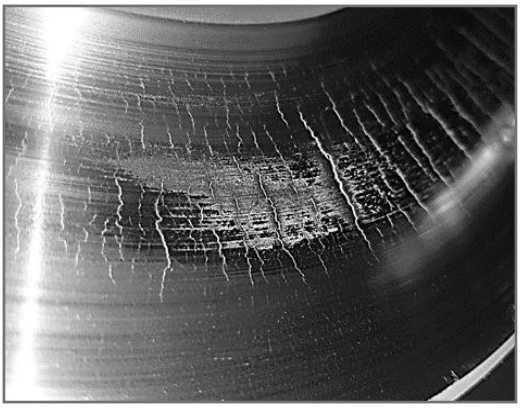


Figure 11. Pad Transfer

2.3.8 Disc Rotor Runout

Lateral runout should not exceed 0.005" (0.12mm) in one rotation of the Rotor. Measurements are made in the center of the disc brake surface with a dial gauge instrument. (See Figure 12.)

Radial runout measures the outer diameter part of the Rotor and should not exceed 0.014" (0.35mm). (See Figure 13.)

If the runout measurement is above the standard, you should check the end play of the wheel bearings and replace the Rotor as necessary.

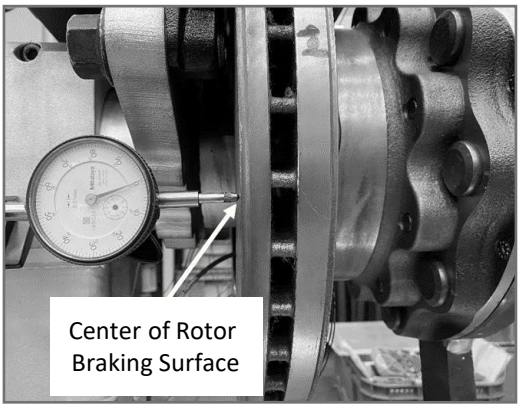


Figure 12. Lateral Runout

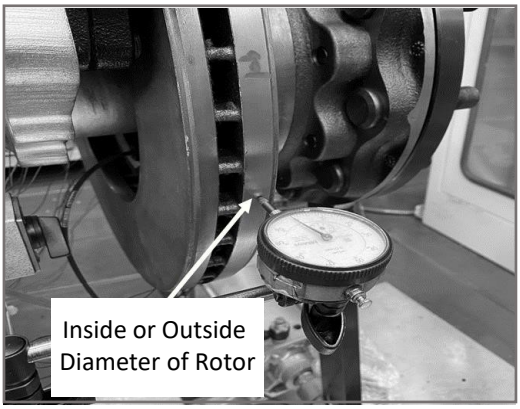


Figure 13. Radial Runout

2.3.9 Rotor Thickness

Rotor thickness should be measured at three points using a micrometer as shown in See Figures 14, 15 and 16.

If the rotor thickness differs by more than 0.002” (0.05mm) between the two positions, the rotor needs to be replaced.

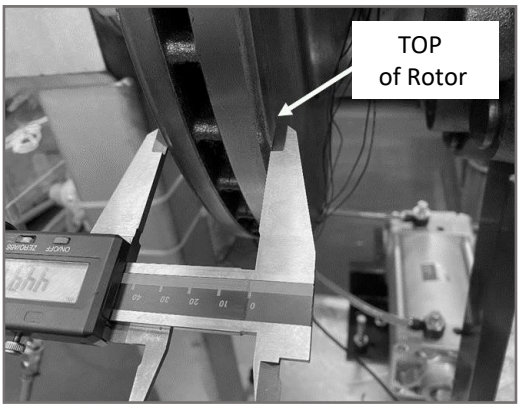


FIGURE 14. Top of Rotor

2.3.10 Rotor Resurfacing

HDNABI® does not recommend rotor resurfacing. However, if necessary, make sure there is a margin of 0.060” beyond the Rotor's minimum thickness specification.

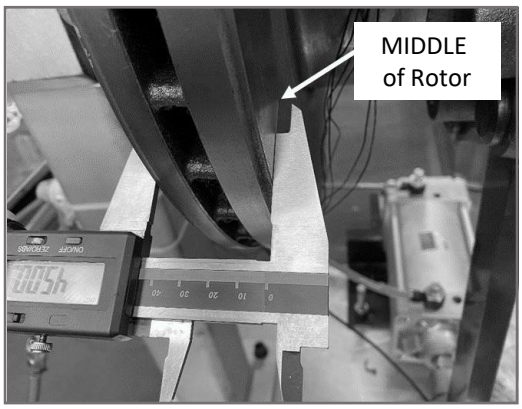


FIGURE 15. Middle of Rotor

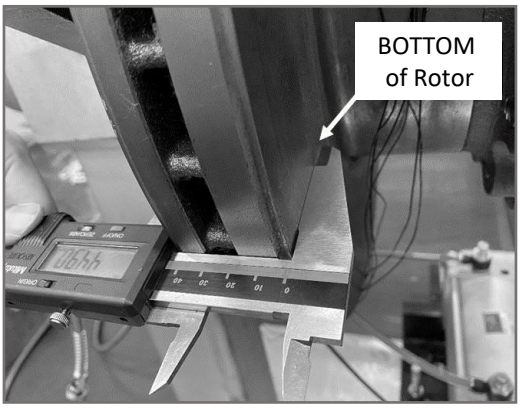


FIGURE 16. Bottom of Rotor

3. HUB AND ROTOR REMOVAL

3.1 Hazard Alert Messages

Read and follow all warning, caution, and danger messages in this section.
Provides information to help prevent serious injury, component damage, and more.

⚠**DANGER** Do not work on a vehicle supported only by Jack. Jack may fall. Serious injury may result. Park your vehicle on a level surface. Secure the wheels to prevent the vehicle from moving. To avoid eye injury, always wear safety glasses when performing vehicle maintenance or servicing.

3.2 Hub and Disc Removal

Read and follow all warning, caution, and danger messages in this section.
Provides information to help prevent serious injury, component damage, and more.

1. Lift and support the axle from a secure stand
2. Disassemble the wheel.
3. Disassemble the wheel end parts.
4. Disassemble the Caliper and Pad according to the brake manufacturer's instructions.
5. Disassemble the spindle nut.

⚠**WARNING** Do not disassemble the spindle nut with a hammer. Damage to components and serious injury may result.

6. Disassemble Hub & Rotor Assembly from Spindle. Be careful not to damage the outer bearing.
7. Disassemble the Hub and Rotor by loosening the Rotor Mounting Bolt. Be careful not to damage the pulse-ring when disassembling.
8. Remove the hub seal.
9. Clean the bearing cup, bearing cone and inside of the hub.
10. Inspect components for wear or damage. Replace components as necessary.
11. Clean the spindle. Remove rust and foreign substances from the bearing seat.
12. Clean the rotor mounting part of the hub.

4. ROTOR BRAKE REPLACEMENT

4.1 Hazard Alert Messages

Read and follow all warning, caution, and danger messages in this section.
Provides information to help prevent serious injury, component damage, and more.

⚠**WARNING** Do not disassemble the spindle nut with a hammer. Damage to components and serious injury may result.

4.2 Part Identification

Rotors can be identified by their cast and machined part numbers. Check the part number before assembly and disassembly work.

FIGURE 17. Casting Rotor Part Number

FIGURE 18. Machining Rotor Part Number

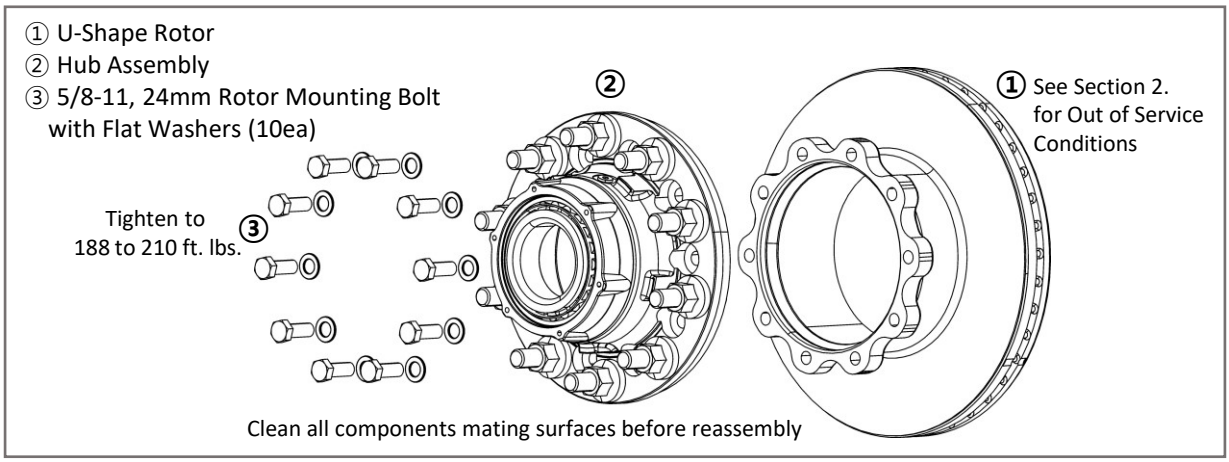
4.3 Rotor Replacement Procedures

HDNABI® U-Shaped Rotor D00808 Disc
Minimum Thickness 1.46”(37.0mm)

1. Clean the rotor mounting part of the hub.
2. Tighten the rotor mounting bolt in a star shape with 188~210 ft.-lbs. (26~29kgf.m).

FIGURE 19. HDNABI U-Shaped Rotor

FIGURE 20. Rotor Installation



5. REINSTALLATION

5.1 Installing HDNABI® Wheel Hub

⚠ **NOTE** TMC'S RP-618A, STEMCO with Conventional Wheel Bearing: Refer to Wheel Bearing Adjustment Procedure for Spindle Nuts.

The Pro-Torq and Zip Torq fasteners installation procedure and bearing adjustment refer to the link below;
571-0006_Pro-Torq-Axle-Fasterner-Installation-Procedure-Bearing-Adjustment_3-20.pdf (stemco.com)
571-0012_Zip-Torq-Axle-Fasterner-Installation-Procedure-Bearing-Adjustment_2-20.pdf (stemco.com)
STEMCO_Bearing-Adjustment-Flyer.pdf

Additional reference
Tech-Tip-30_Inspection-Rebuild-Reassembly-of-Submerged-Tractor-and-Trailer-Wheel-Ends_9-18.pdf (stemco.com)
Tech-Tip-49_Identification-of-non-leaking-seal-versus-leaking-seal_1-16.pdf (stemco.com)

1. Apply the same type of clean lubricant to the bearing as before.
2. After installing the bearing, tighten the spindle nut to 200 ft.-lbs. (27.7kgf.m) using a torque wrench and turn the Hub at least one turn.
3. Loosen the spindle nut one turn in the opposite direction.
4. Retighten the spindle nut to 100 ft.-lbs. (13.8kgf.m) using a torque wrench and turn the Hub at least one turn.
5. Refer to the table below and loosen the spindle nut in the opposite direction.

PRO-TORQ™ PART NO.	ZIP-TORQ™ PART NO.	BACK OFF
Trailer Axle Fastener		
447-4723, 447-4724 449-4973	400-4723, 400-4973	1/8 Turn
447-4743	400-4743	1/4 Turn

6. Install and fix the keeper (only for PRO-TORQ™). If it is not fixed, the parts may fall out and cause injury. Make sure that it is fully installed. (See Figure 21.)
7. Using a dial gauge, measure the end-play in the range of 0.001 to 0.005" (0.03 to 0.12mm).

⚠ **NOTE** If the end play is out of range, readjustment is required. Replace components as necessary.

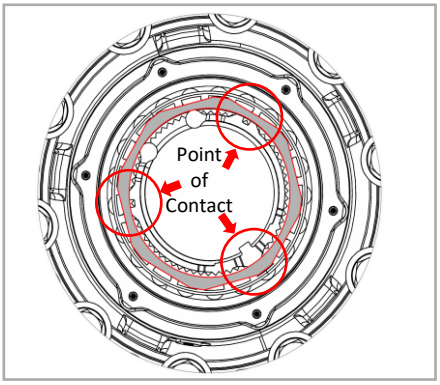


FIGURE 21. Correct Keeper Position

5. REINSTALLATION

5.2 Caliper Installation

1. Reassemble the Pad and Caliper according to the brake manufacturer's recommended instructions. (Ref. HDNABI Service Manual SM-8907-Rev5.)
2. Install the wheel and fasten the wheel nut.
3. When tightening the wheel nut, pre-tighten it in a star shape of 50 to 100 ft.-lbs. and then re-tighten to 450 to 500 ft.-lbs. Torque control equipment must be used for final tightening.

6. LUBRICATION

6.1 Trailer Hubs with Oil Lubricant

⚠ **NOTE** Use only oil approved by the seal manufacturer. The Hub has a hole to inject lubricant.

1. Inject oil through the Hub Cap or the Fill hole of the Hub.
2. Add oil to the "Oil level" point on the surface of the Hub Cap (see Figure 22.).
3. After injection, connect the oil plug to prevent oil leakage.

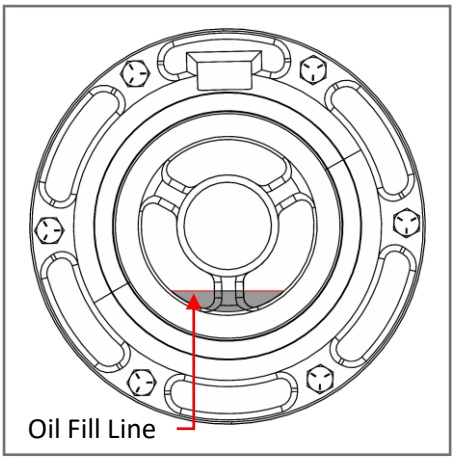


FIGURE 22. Fill to "Oil Level Line"

6.2 Trailer Hubs with Semi-Fluid Grease Lubricant

⚠ **CAUTION** When using Semi-Fluid Grease for Hub for trailer, you must follow the procedure in the above section.

⚠ **WARNING** Failure to fill the Hub with the correct amount of Semi-Fluid Grease may cause damage to the Hub, Bearings and Wheel.

1. Disassemble the oil plug.
2. Gently loosen the hub cap bolt to allow air to escape from the Hub.
3. Inject Semi-Fluid Grease through the fill hole of the Hub.

Refer to the table below for the proper dosage of Semi-Fluid Grease.

HUB TYPE	MATERIAL	BRAKE TYPE	NO. of STUDS	PART NO.	VOLUME (Fl.Oz.)
TN	Iron	Disc	10	HY01142	15.5
TP	Iron	Disc	10	HY01143	34.4

* The above injection amount may change depending on the Hub Cap manufacturer, so please refer to it only.
** For Hub other than the part number in the table, please contact HDNABI's Customer Service (1-888-693-7073.).

4. Refasten the Hub Cap Bolt with 12 to 18 ft.-lbs.
5. Retighten the oil plug with 20 to 25 ft.-lbs.

7. WHEEL INSTALLATION

7.1 Hub Pilot Wheel Mounting System

⚠ **NOTE** If you need to use lubricant for the wheel bolt threads do not apply lubricant to the flat mating surface of the Hub and the Wheel.

⚠ **WARNING** Always tighten the upper wheel nut first. Nut tightening order is from 1 to 10. (See Figure 23.)

1. Clean all mating surfaces on the hub and nuts. Remove loose paint, scale, and any material building around the pilots of the hub and wheels. Be sure paint is fully cured on recently refurbished wheels.

⚠ **CAUTION** Care must be taken not to damage the Hub and other components.

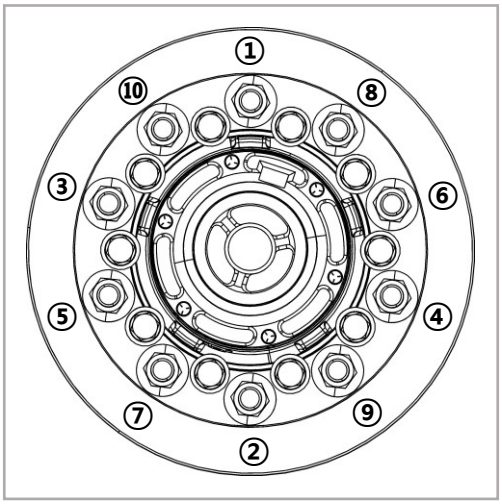


FIGURE 23. 10 Stud Tightening Sequence

2. Apply two drops of oil between the nut and the nut flange, and apply two drops of oil to the 2~3 threads of each wheel stud bolt end. Also, lubricate the wheel pilot part of the Hub to facilitate wheel assembly and disassembly.
3. Before installing the wheel, rotate the Hub so that one of the wheel pilot bosses is at the top (12 o'clock position) (see Figure 24).
4. When install the wheel, use more than one wheel nut to hold the wheel.
5. First, pre-tighten the upper wheel nut to 50 ft.-lbs.
6. Pre-tighten the remaining wheel nuts to 50 ft.-lbs. in sequence, then re-tighten to 450-500 ft.-lbs. Torque control equipment must be used for final tightening. (See Figure 23.)

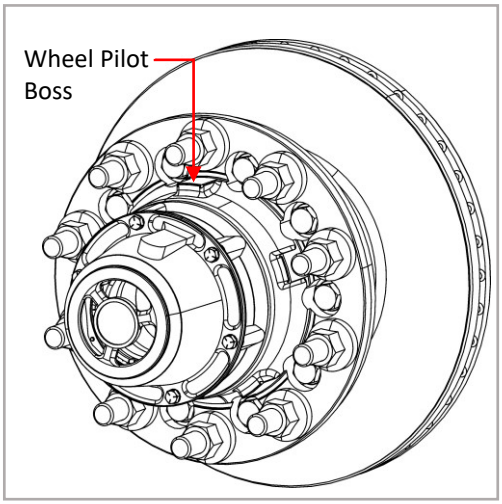


FIGURE 24. Rotating the Hub

⚠ **NOTE** When tightening the wheel nut, the temperature of the wheel end components should be as close as possible to the midpoint of the expected operating range.
For example, if the Hub is operating between 0°F and 150°F, 75°F is a suitable temperature for tightening.
This recommendation is due to differences in the coefficient of thermal expansion for the material of the wheel end components, including the hub, stud bolt, wheel, etc.
If the wheel nut is torqued at a temperature much lower than the middle point, excessive stress may be applied to the wheel stud as it warms up. This can permanently stretch the wheel stud and loosen the nut or damage the wheel or hub. When torque is applied at a high temperature, the wheel or wheel stud may be damaged.

7. WHEEL INSTALLATION

7.1 Hub Pilot Wheel Mounting System

⚠ **NOTE** Use the appropriate nuts with the above technique to install the front and outer dual wheels. Follow your shop practice to locate the valve stems.

7. Check if the wheel is seated in the wheel pilot part and turn the wheel to check if there is no problem.

⚠ **DANGER** If the tightening torque of the wheel nut is excessive or loose, damage may occur or the wheel may be separated, resulting in serious injury or damage. Always use torque control equipment. First pretighten to 50-100 ft.-lbs., then refasten to 450-500 ft.-lbs.

8. SPECTIONS

* Wheel End Torque Specifications

ITEM	MEASUREMENT	TORQ. (ft.-lbs.)	NOTES
Hub Pilot Wheel Nut	M22 x 1.5	450 - 500	Always tighten the top nut first or pilot damage may result. Apply two drops of oil between the nut and nut flange, and two or three drops to the outermost 2 or 3 threads of the wheel studs. Lightly lubricate the wheel pilots on the hub. The last nut rotation should be with a calibrated torque device.
Hub Cap	5/16-18 UNC	12 - 18	Minimum SAE Grade 5 fasteners, flat washers only.
Oil Fill Plug	9/16-18 UNF	20 - 25	O-Ring Type
Disc Brake Rotor Screw	5/8-11 UNC	190 - 210	-