

## Instructions & Procedures for Replacing Wheels In Fabricated Steel Housings

For Fan Models PBS, HP-Series I & II, RBE, HDBI, HDAF, SQBI, SQAF, CPF and CPAF

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### **DANGER**

THE INSTRUCTIONS AND PROCEDURES IN THIS MANUAL SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL WITH MECHANICAL MACHINE TRAINING OR EXPERIENCE. PROPER EYEWEAR SAFETY AND ALL APPLICABLE OSHA SAFETY REGULATIONS MUST BE UTILIZED WHILE PERFORMING THE PROCEDURES CONTAINED HEREIN. BEFORE STARTING ANY OF THE PROCEDURES CONTAINED HEREIN, POWER TO THE MOTOR MUST BE DISABLED USING OSHA LOCK-OUT/TAG-OUT PROCEDURES. DO NOT ATTEMPT TO START THESE PROCEDURES UNTIL THE BLOWER WHEEL, INSIDE THE BLOWER HOUSING, HAS COME TO A COMPLETE STOP. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN BLOWER FAILURE, PROPERTY DAMAGE, SEVERE PERSONAL INJURY AND DEATH.

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**Fabricated Steel Products**

## I. REPLACING WHEELS WITH TAPER-LOCK BUSHINGS IN STEEL HOUSINGS.

1. **Make sure the power to the motor has been disabled using the proper OSHA Lock-out/Tag-out procedures, and the blower wheel has come to a complete stop. If you were not trained in the OSHA Lock-out/Tag-out procedures, consult a licensed electrician that has been trained.**
2. Disconnect any duct work or hose connections from the inlet and/or discharge of the blower housing. If necessary, or easier, disconnect the blower base and move the complete blower, motor and base assembly to the floor or a work bench.
3. Loosen and remove all the nuts and washers that hold the inlet plate onto the blower housing. Remove the inlet plate. All fans with "backward inclined" or "airfoil" type wheels also have an inlet bell and a separate inlet plate that extends to the floor. The inlet bell has an "air diverter" welded to the back side of the bell. **The location of the diverter inside the housing is critical.** When pulling the bell out of the housing, **match mark** the housing so when you reassemble the parts later, the diverter will be in the correct position. **Failure to do this will reduce airflow and/or pressure.**
4. A gasket material was applied around the inlet of the blower when it was manufactured. Inspect the gasket and replace it if it has become torn, or broken. Without a good gasket, the blower will leak during operation.
5. **CRITICAL:** Measure the distance from the front of the hub/bushing flange to the end of the fan or motor shaft.  
**Write down the dimension for later.**
6. There are three hex head bolts in the taper-lock bushing in the center of the wheel. Remove the bolts.
7. Place two of the bolts into the "**threaded push-off holes**" in the front of the taper-lock bushing.
8. Using a wrench, tighten each bolt a little at a time until the taper-lock bushing comes loose from the taper-lock hub.
9. Remove the wheel from the fan or motor shaft and remove the key from the keyway..
10. Inspect and clean the fan or motor shaft of any foreign material. Any nicks and burrs must be removed with a file and emery paper.  
**WARNING:** All wheels, with taper-lock hubs, were balanced at the factory with the hub and bushing that is shipped with each wheel. Changing the bushing could affect the balance of the wheel. Also, it is common to have to "**trim balance**" the new wheel after it is assembled into the fan. **Failure to trim balance the wheel could lead to bearing and/or catastrophic wheel and fan failure.**
11. The new wheel will have a new taper-lock hub with 3 new hex head bolts to tighten the hub into the wheel. Make sure the bushing is loose inside the hub and install the 3 bolts into the 3 **clearance holes** in the bushing, and the **threaded holes** in the hub, just to where the bolt heads are touching the bushing flange.
12. Install a new key into the keyway and install the wheel onto the fan or motor shaft.  
**Make sure the wheel is located on the fan or motor shaft per the same dimension you took in Step 5 above.**  
**NOTE:** As you begin to tighten the bushing bolts into the hub of the wheel, the wheel will slide forward about 1/4" to 1/2". You will need to compensate for the sliding to attain the correct final wheel location on the shaft.
13. Begin tightening the 3 bolts in the taper-lock bushing, into the hub, equally. Tighten 1 bolt a very little and then the other 2 bolts the same way. This will properly "align" the taper in the bushing with the taper in the hub.
14. Tighten the 3 bolts to the proper torque as listed in **Table 1** below.

Table 1

TORQUE VALUES FOR TAPER-LOCK BUSHINGS	
Taper-lock Bushing Size	Required Torque ( in Inch Pounds)
H	95
B & P	192
Q & R	350

15. Spin the wheel by hand to make sure it is not rubbing the back of the housing.
16. Remount the inlet plate, and inlet bell if so equipped, with the same hardware you removed in **Step 3** above. If the fan has a separate inlet bell, make sure the diverter is in the proper location per the match mark you made in **Step 3** above.
17. **CAREFULLY** reach into the blower inlet and spin the wheel by hand to make sure it is not rubbing anywhere inside the blower housing and that it rotates freely. If there is a rubbing or grinding sound, locate the cause and correct it.
18. Re-install the blower, motor, base assembly back into the system, if it was removed.
19. Reconnect any duct work, guards or accessories that were removed in **Step 2** above.
20. Reconnect the wiring to the motor in accordance with National Electric Code (NEC) standards.
21. "**Bump start**" the motor and turn the power off. As the wheel is slowing down, check to make sure it is turning the proper rotation. If it is not, reverse any two power leads (on 3 Phase motors only) and repeat this step until the proper rotation is achieved.
22. Perform a vibration test to make sure the vibration levels do not exceed the limits shown in the maintenance manual. You will need to refer to the maintenance manual for your model fan and arrangement for the correct information. All maintenance manuals can be found on our web site listed on the front cover of these instructions.

**NOTE: Any open inlet, discharge, belts and sheaves or couplings MUST be guarded per OSHA standards.**

## II. REPLACING WHEELS WITH STRAIGHT BORES IN STEEL HOUSINGS.

1. **Make sure the power to the motor has been disabled using the proper OSHA Lock-out/Tag-out procedures, and the blower wheel has come to a complete stop. If you were not trained in the OSHA Lock-out/Tag-out procedures, consult a licensed electrician that has been trained.**
2. Disconnect any duct work or hose connections from the inlet and/or discharge of the blower housing. If necessary, or easier, disconnect the blower base and move the complete blower, motor and base assembly to the floor or a work bench.
3. Loosen and remove all the nuts and washers that hold the inlet plate onto the blower housing. Remove the inlet plate. All fans with "backward inclined" or "airfoil" type wheels also have an inlet bell and a separate inlet plate that extends to the floor. The inlet bell has an "air diverter" welded to the back side of the bell. **The location of the diverter inside the housing is critical.** When pulling the bell out of the housing, **match mark** the housing so when you reassemble the parts later, the diverter will be in the correct position. **Failure to do this will reduce airflow and/or pressure.**
4. A gasket material was applied around the inlet of the blower when it was manufactured. Inspect the gasket and replace it if it has become torn, or broken. Without a good gasket, the blower will leak during operation.
5. **CRITICAL:** Measure the distance from the front of the wheel hub to the end of the fan or motor shaft. **Write down the dimension for later.**
6. Loosen and remove the two set screws in the side of the wheel hub with an Allen wrench. **Discard the used set screws.**
7. Remove the wheel from the fan or motor shaft and remove the key from the keyway..
8. Inspect and clean the fan or motor shaft of any foreign material. Any nicks and burrs must be removed with a file and emery paper.  
**WARNING:** All wheels were balanced at the factory before shipment. Changing a wheel will generally affect the final balance of a fan, therefore it is common to have to "trim balance" the new wheel after it is assembled into the fan. **Failure to trim balance the wheel could lead to bearing and/or catastrophic wheel and fan failure.**
9. There are two set screw in the hub of each wheel. Make sure the set screws in the new wheel are not protruding **into** the bore or keyway.
10. Install a new key into the keyway and install the new wheel onto the fan or motor shaft. In most cases the blower wheel can be mounted on the blower or motor shaft with just a little force. If the wheel does not slide on, check the bore and blower or motor shaft for nicks or burrs. The wheels are bored with a  $-.000$ " to  $+.001$ " tolerance so a slight interference may occur between the wheel bore and the blower or motor shaft. If this is the case, a moderate amount of force may be required by using a rawhide or hard rubber mallet. **DO NOT USE A STEEL HAMMER. Using a steel hammer may damage the blower or motor bearings and it can deform the wheel and/or crack the hub. Make sure the wheel is located on the fan or motor shaft per the same dimension you took in Step 5 above.**  
**NOTE:** The set screws must be tightened to the proper torque as shown in Table 1 below. **DO NOT** use an air driven tool such as an impact wrench or pneumatic wrench. These tools could weaken or strip the threads in the wheel.
11. **IMPORTANT:** Tighten the set screw over the keyway **first**. Then tighten the set screw onto the shaft.

Table 1

SET SCREW TORQUE VALUES		
Diameter Number of Threads Per Inch	Hex Wrench Size (Across Flats)	Required Torque (in Inch Pounds)
1/4-20	1/8"	65
5/16-18	5/32"	165
3/8-16	3/16"	228
7/16-14	7/32"	348
1/2-13	1/4"	504
5/8-11	5/16"	1104

12. Spin the wheel by hand to make sure it is not rubbing the back of the housing.
13. Remount the inlet plate, and inlet bell if so equipped, with the same hardware you removed in **Step 3** above. If the fan has a separate inlet bell, make sure the diverter is in the proper location per the match mark you made in **Step 3** above.
14. **CAREFULLY** reach into the blower inlet and spin the wheel by hand to make sure it is not rubbing anywhere inside the blower housing and that it rotates freely. If there is a rubbing or grinding sound, locate the cause and correct it.
15. Re-install the blower, motor, base assembly back into the system, if it was removed.
16. Reconnect any duct work, guards or accessories that were removed in **Step 2** above.
17. Reconnect the wiring to the motor in accordance with National Electric Code (NEC) standards.
18. **"Bump start"** the motor and turn the power off. As the wheel is slowing down, check to make sure it is turning the proper rotation. If it is not, reverse any two power leads (on 3 Phase motors only) and repeat this step until the proper rotation is achieved.
19. Perform a vibration test to make sure the vibration levels do not exceed the limits shown in the maintenance manual. You will need to refer to the maintenance manual for your model fan and arrangement for the correct information. All maintenance manuals can be found on our web site listed on the front cover of these instructions.

**NOTE:** Any open inlet, discharge, belts and sheaves or couplings **MUST** be guarded per OSHA standards.