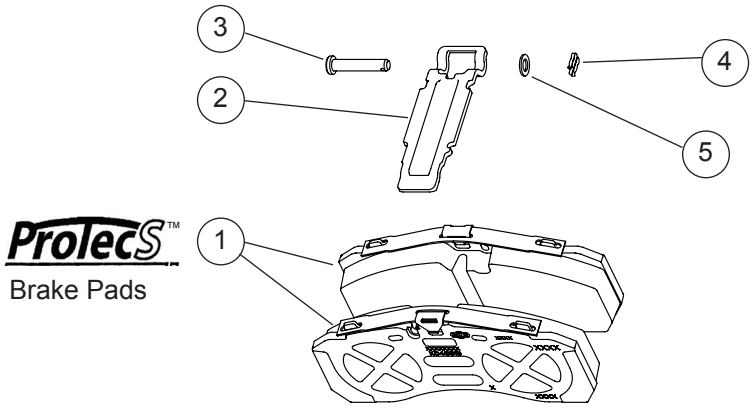
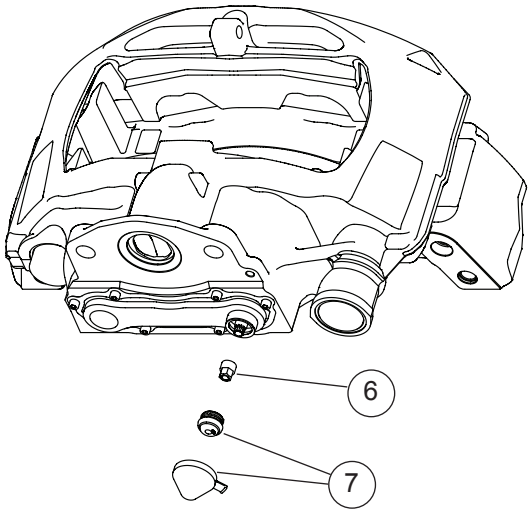
Installation Instructions

KNORR® PROTEC S™ AIR DISC BRAKE PAD KIT FOR BENDIX® SB-7™ & KNORR® SN-7™ AIR DISC BRAKES





Kit Contents		
Item No.	**Description**	**Qty.**
1	Knorr® ProTec S™ Brake Pads (with Spring)	4
2	Brake Pad Hold Down Bar	2
3	Hold Down Bar Pin	2
4	Pin Retention Clip	2
5	Washer	2
6	Brake Adjuster Adapter	2
7	Adjuster Cap (2 Styles)	4

Figure 1 – Air Disc Brake Pad Replacement Components

PREPARATION

1. Follow all General Safety Guidelines outlined on pages one and two. Be sure that the vehicle is parked on a level surface and block the wheels.

2. **IMPORTANT**

   If equipped with spring brakes, cage the spring brakes on all axles to be worked on. Consult the vehicle manufacturer's instructions as necessary.

3. Raise the complete axle to be worked on until the tires clear the ground. Remove the wheels using the procedures specified in the vehicle maintenance manual.

DESCRIPTION

The Bendix® air disc brake system uses a floating caliper design to provide foundation braking on all axles of heavy commercial vehicles and trailers. This system is available on models with or without a combination spring brake unit. Optional wear sensors and wear diagnostic equipment are available on some models.

GENERAL SAFETY GUIDELINES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following guidelines should be observed AT ALL TIMES:

- ▲Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, EXTREME CAUTION should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si® air dryer, be sure to drain the purge reservoir.
- ▲Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲Never exceed manufacturer's recommended pressures.
- ▲Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲The power MUST be temporarily disconnected from the radar sensor whenever any tests USING A DYNAMOMETER are conducted on a vehicle equipped with a Bendix® Wingman® system.
- ▲You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.

⚠ WARNING: AVOID CREATING DUST. POSSIBLE CANCER AND LUNG DISEASE HAZARD.

While Bendix Spicer Foundation Brake LLC does not offer asbestos brake linings, the long-term affects of some non-asbestos fibers have not been determined. Current Occupational Safety and Health Administration (OSHA) Regulations cover exposure levels to some components of non-asbestos linings, but not all. The following precautions must be used when handling these materials.

Avoid creating dust. Compressed air or dry brushing must never be used for cleaning brake assemblies or the work area.

- ▲ **Bendix recommends that workers doing brake work must take steps to minimize exposure to airborne brake lining particles. Proper procedures to reduce exposure include working in a well-ventilated area, segregation of areas where brake work is done, use of local filtered ventilation systems or use of enclosed cells with filtered vacuums. Respirators approved by the Mine Safety and Health Administration (MSHA) or National Institute for Occupational Safety and Health (NIOSH) should be worn at all times during brake servicing.**
- ▲ **Workers must wash before eating, drinking, or smoking; shower after working, and should not wear work clothes home. Work clothes should be vacuumed and laundered separately without shaking.**
- ▲ **OSHA & EPA Regulations regarding testing, disposal of waste, and methods of reducing exposure for asbestos are set forth in 29 & 40 Code of Federal Regulations §1910.1001 & 61.150, respectively. These Regulations provide valuable information which can be utilized to reduce exposure to airborne particles.**
- ▲ **Safety Data Sheets on this product, as required by OSHA, are available from Bendix. Call 1-800-247-2725 and speak to the Tech Team or e-mail techteam@bendix.com.**

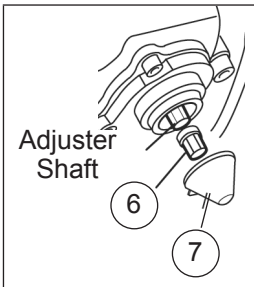


Figure 2 – Exploded View of Adjuster and Adapter

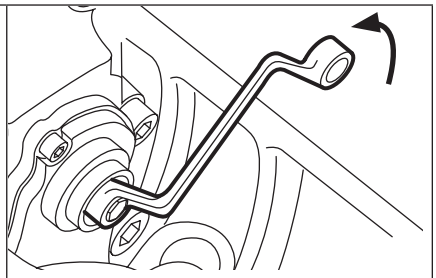


Figure 3 – Backing-off the Adjuster Mechanism

BRAKE ADJUSTMENT

The caliper contains a brake adjuster mechanism that turns the adjuster shaft to set a gap (running clearance) between the rotor and the brake pads. When operated manually with the adjuster shaft, the adjuster mechanism sets the system's non-braked position. The adjuster mechanism also operates automatically, whenever the brakes are activated, to compensate for rotor and brake pad wear and keep the running clearance constant.

Vehicles with Wear Sensors. If the air disc brake is equipped with a clip sensor wear indicator (*see Service Data sheet SD-23-7541 for more details*), remove and retain the mounting hardware for the cable protection plate. The cable protection plate can then be set aside while servicing the pads. Note the position of the sensors in the brake pad channels, and carefully remove them. In most cases you do not need to release the cable connector in order to move the sensors away from the pad installation work area. Inspect the wear sensors and replace if they are damaged or abraded.

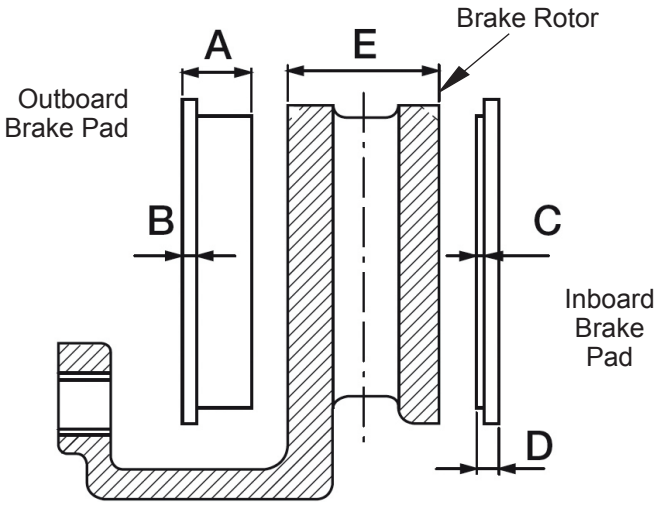
DISASSEMBLY

1. Remove and discard the pin retention clip (4) and washer (5).
2. While pressing against the pad hold down bar (2), remove and discard the hold down bar pin (3) and hold down bar (2).
3. Remove the adjuster cap (7) to expose the adjuster shaft (*see Figure 2*). Note the type of cap used.
4. Inspect the adjuster shaft adapter. If significant corrosion and/or damage is present, remove the adjuster adapter (6) using needle-nose pliers and replace it with the adjuster adapter (6) supplied in this kit.

⚠ CAUTION

Avoid overloading or damaging the adjuster shaft. The recommended tool is a 10 mm 6-point box wrench. Do not use an open-ended wrench since it may damage the adjuster shaft.

5. Use a 10 mm 6-point box wrench (*see Figure 3*) to turn the adjuster counterclockwise until sufficient space exists to remove the brake pads. A clicking noise occurs as the adjuster turns.
6. Remove the inboard and outboard brake pads (1).
7. Repeat the procedure for the other end of the axle.
8. Check for uneven end-to-end pad wear. If the difference in wear is greater than 0.080 in. (2 mm), replace the brake pads AND also service the guide pins.
9. Measure the thickness of the friction material on the brake pads (*see Figure 4*).
10. If the overall thickness of either brake pad is less than 0.433 in. (11 mm), replace both brake pads.
11. If the difference of inboard and outboard pad thickness is greater than 0.138 in. (3.5 mm), the caliper may not be sliding freely on the guide pins. Replace the brake pads AND service the guide pins**.**



A	Thickness of a new pad (1.181 in.) (30 mm).
B	Backing plate thickness (0.360 in.) (9 mm).
C	Minimum thickness of friction material (0.080 in.) (2 mm).
D	Minimum thickness of a worn pad (0.433 in.) (11 mm); replace pads.
E	Thickness of a new rotor (1.77 in.) (45 mm). Minimum rotor thickness (1.46 in.) (37 mm).

Figure 4 – Pad and Rotor Dimensions

Brake Rotor Inspection

1. Measure the thickness of the brake rotor at its thinnest point. Avoid measuring near the edge of the rotor, as a burr may result in an inaccurate measurement.
2. Replace the rotor if the thickness is less than 1.46 in. (37 mm).
3. Check the rotor for grooves and cracks (*see Figure 5*).

IMPORTANT

Where the surface conditions are found to be in the acceptable range (as indicated in Figure 5), the rotor is still usable until reaching the minimum acceptable thickness of 1.46 in. (37 mm).

Machining (Grinding or Turning) Rotors

Bendix® brand rotors are normally service-free. In the case of severe grooving of the entire friction surface, however, conventional rotors may be turned when changing pads, to increase the load-bearing surface.

Machining of Bendix® Splined Disc® rotors is not permitted.

CAUTION

Always maintain air disc brake pads and rotors within specifications. Excessive pad or rotor wear will degrade braking performance.

Periodic inspection of the Bendix® Splined Disc® attachment hardware is recommended to ensure optimum braking performance. Bendix recommends verifying the torque on the spring element fasteners whenever a brake inspection is performed.

WARNING

After machining/turning, the minimum rotor thickness for Bendix® brand rotors must be at least 1.535 - 1.575 in. (39 - 40 mm) – for other brands, consult the manufacturer's guidelines. Also, check the vehicle manufacturer's recommendations. Failure to comply may result in brake failure and in serious injury or death. The machining of Bendix splined disc rotors is not permitted.

CALIPER CHECK

1. Slide the caliper back and forth on the guide pins – it should move freely. If the caliper does not move freely, service the guide pins.
2. Inspect the tappet and guide pin boots for cracks and tears. Replace as necessary.

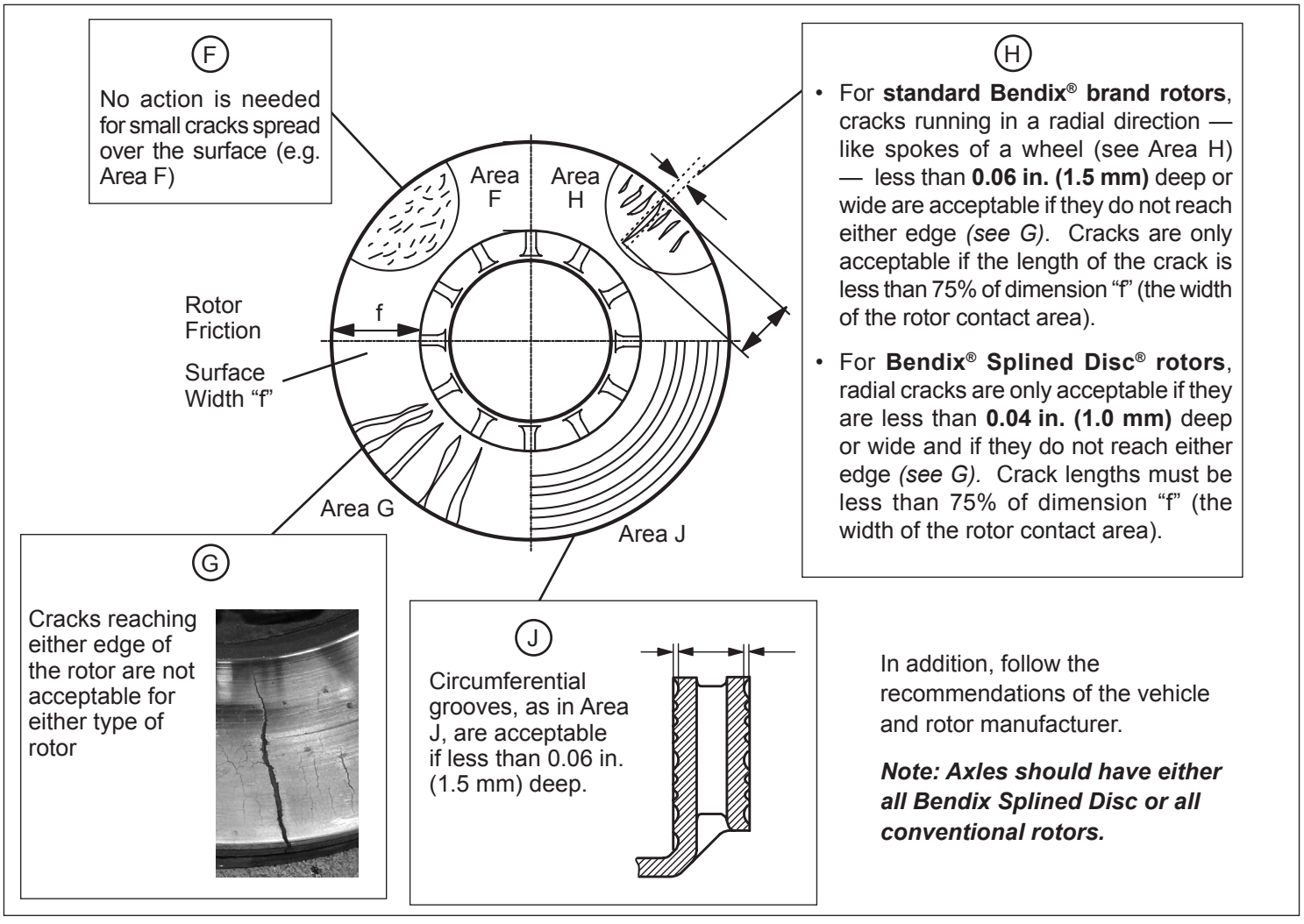


Figure 5 – Examples of Acceptable and Non-acceptable Rotor Conditions

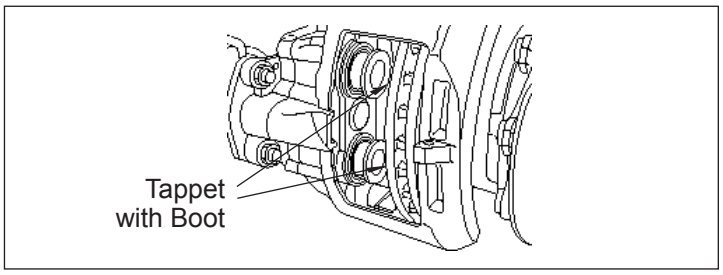


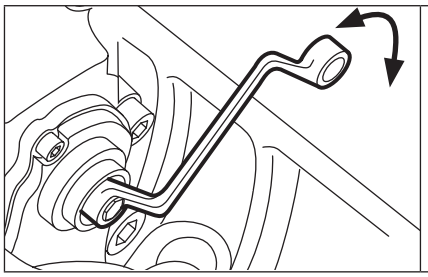
Figure 6 – Tappet Boot Inspection

BRAKE PAD INSTALLATION

IMPORTANT

Always replace brake pads as an axle set. Use only Bendix® brand replacement parts. Before installing the brake pads, use the adjuster and fully retract the tappets to provide adequate clearance.

1. Clean the pad abutment.
2. Pull the caliper fully outward and install the outboard Knorr® ProTec S™ pad (1). Move the caliper fully inward and install the inboard pad (1).
3. To reinstall the wear indicators (if used): Insert the wear sensors into position in the new brake pads. Route the sensor cable through the cable protection plate channel and secure the plate with the mounting hardware retained at disassembly. *(See Service Data sheet SD-23-7541.)*



Turn the shear adapter (6) clockwise until the pads contact the rotor. Then turn it counter-clockwise and listen for the sound of 3 clicks.

Figure 7 – Running Clearance Adjustment

4. Using a 10 mm, 6-point box wrench, turn the brake adjuster adapter (6) **clockwise** until the pads contact the rotor. Note: Do not use an open-ended wrench as this may damage the adapter. *(See Figure 7)*.
5. Using the same tool, turn the brake adjuster adapter (6) **counterclockwise** and listen for the sound of three clicks as the mechanism backs-off (increases) the running clearance. *(See Figure 7).*
6. Select the correct replacement adjuster cap (7) from those supplied with the kit. Lightly grease the adjuster cap (7) with Renolit® HLT2 white grease (part number I I14525) and install the cap.
7. Push the new pad retainer bar (2) into the groove of the caliper. Press down on the pad retainer bar (2), and insert the pad retainer pin (3), with the pin pointing downwards, where possible. Install the supplied washer (5) and then the spring clip (4). *(See Figure 1).*

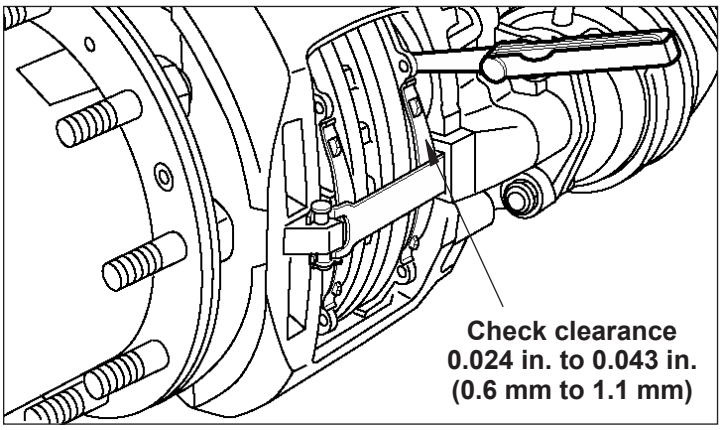
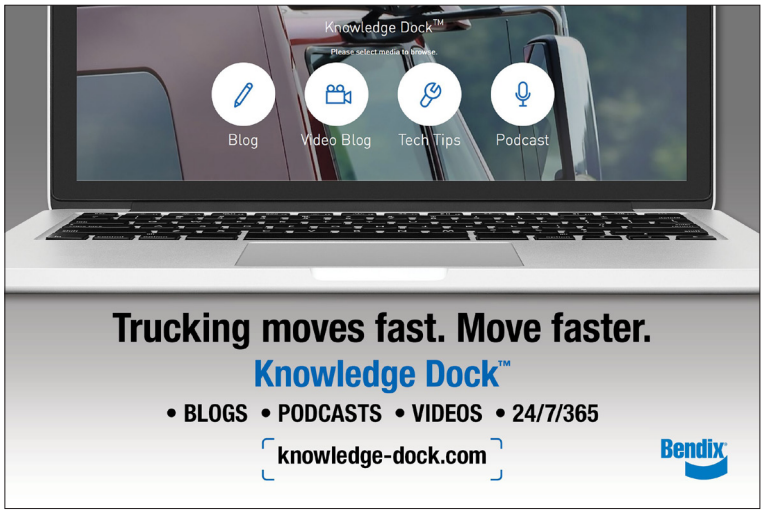


Figure 8 – Running Clearance Check

8. Apply and release the brakes. The hub should turn easily by hand after applying and releasing the brake.
9. Re-check the running clearance. (*See Figure 8.)* Readjust if necessary.
10. Install the cap (7).
11. Reinstall the wheel, following the vehicle manual instructions.

WARNING

The brake pads and rotors must be maintained within the recommended wear limits. Failure to monitor wear and replace the brake pads and rotors when required may result in diminished brake performance.



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