

## New Bearing Preparation with Krytox™ Lubricants

### Product Information

#### Before You Start

Dirt is one of a bearing's worst enemies. That's why it is so important to work in a clean area, with bearings and lubricants covered until ready for use. When handling bearings, wear clean elastomer gloves and use clean, lint-free rags. Compressed air, if used, should be filtered and dried. Do not spin a bearing with compressed air. Even though a bearing might not have grease or oil in it, it will have anti-rust preservatives that will prevent proper adhesion of Krytox™ lubricant, and the preservatives must be removed before filling the bearing.

Before adding Krytox™ grease to a bearing, the bearing should be cleaned of all existing greases, oils, or preservative oils used to protect it during storage. If left in the bearing, these hydrocarbon oils can form carbon deposits at higher temperatures that may accelerate bearing failure.

#### 1. Cleaning

- a. Remove the seal by carefully prying between it and the inner ring. Care should be taken to prevent the prying tool from coming in contact with any race pathway, the cage, or the rolling elements of the bearing. Shields normally cannot be removed from a bearing without causing damage; so, they are typically not good candidates for a lubricant change.
- b. A standard parts cleaner/washer can be used to clean the grease and/or rust preventative from the bearings. Aqueous or solvent based fluids including non-chlorinated brake parts cleaner can be used. Chlorinated solvents should be avoided, because they can leave chlorine that can cause corrosion. Fluorinated solvents will not work for the removal of

hydrocarbon lubricants. If an aqueous based cleaning fluid is used the parts should then be rinsed with a high flash solvent. If the parts cleaner is heated, the temperature should be maintained below the flash point of the solvent. Do not allow the solvent to get too contaminated, as cleaning effectiveness will be reduced. Follow proper precautions and safety measures for the corresponding solvent/cleaner used.

- c. Dry the bearings by circulating warm air through the bearing or by heating to 93.3 °C (200 °F) for 10 minutes. Allow to cool to room temperature. The metal must be completely dry of all solvents, or the grease might not adhere properly and could cause the bearing to fail prematurely. Volatile solvents can also be used as a final rinse to remove heavier solvents, for speed drying, and to ensure the bearing is completely clean. However, volatile solvents are more flammable; so, caution must be used when handling them.

After the bearing surfaces are clean, they should be lubricated/wiped with Krytox™ lubricant and properly stored to prevent corrosion.

#### 2. Repacking

- a. Cleaned bearings should be lubricated immediately with the specified lubricant. Rolling elements may be pre-lubricated with Krytox™ oil that has the same viscosity as the base oil in the grease. Lubricate each rolling element with a drop of oil and slowly rotate with a slight thrust by hand, so that the elements rotate to evenly spread the oil.
- b. The correct amount of grease should be weighed on a gram balance and transferred to a clean syringe. Remember that the specific gravity of Krytox™ grease is about 2.0 mg/L, and fill by volume rather than by weight.

- c. Once the syringe is packed with the correct amount of lubricant, inject half of the grease equally in each of the cavities between the rolling elements, from one side of the bearing. Repeat, using the remaining grease on the other side of the bearing.
- d. Rotate the bearing slowly by hand to spread and distribute the lubricant. Enough thrust should be applied by hand to cause the rolling elements to rotate.
- e. Replace seals or shields carefully to avoid causing damage that would allow the grease to leak out prematurely.

### How much grease to put in a bearing?

Proper lubrication is achieved by using the correct amount of grease. Too little grease in the bearings causes premature failure. Too much grease at the initial fill or during re-lubrication can cause overheating of bearings that are running at medium to high speed, resulting in bearing failure. The amount of grease put in the bearing depends on the application and operating speed.

- For applications such as conveyor rollers and low-speed machinery with DN values (inner race ID in mm x rpm) below 50,000, the bearing can be filled to about 60–75% of the free volume.
- For medium-speed applications, i.e., DN 50,000 to 200,000, the bearing can be filled 35–50%.
- For higher-speed systems, the fill is typically 25–35%.
- Some extreme-speed special applications have grease fills of only 10–15% (see Speed Factor for definition of DN values).

Because Krytox™ grease is heavier than hydrocarbon lubricants, its higher density must be considered when determining the fill quantity by weight. Consult your bearing manufacturer for the capacity of the specific bearing you are using.

To ensure that another type of grease is not accidentally put into the bearing, grease fittings should be changed to a different style, such as button-head or pin type. A dedicated grease gun that matches the fitting should be used.

### Speed Factor

The speed factor (DN) indicates the permissible speed range for grease in a rolling bearing. The DN value is the inner race i.d. in millimeters multiplied by the RPM. DN values of 100,000 to 400,000 and higher have been achieved at temperatures of 204 °C to 260 °C (400 °F to 500 °F) in actual field service using Krytox™ greases. At very high speeds, a special break-in run might be needed to spread the grease to avoid overheating.

The speed factor is affected by the base oil type, in addition to viscosity and thickener type, and is a measure of the lubricant's internal friction. The limiting speed for grease-lubricated rolling bearings is dependent on the type of bearing, its load, speed, precision, and lubrication system.

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