

Inspection and Installation Procedures for REALI-SLIM® Thin-Section Bearings

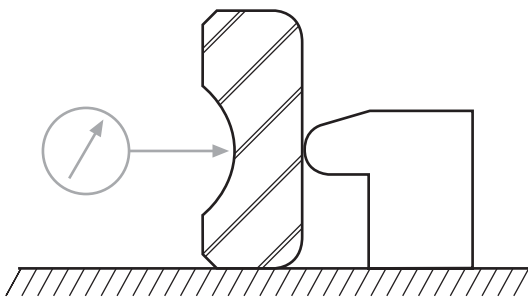
Inspection

The unique proportions of REALI-SLIM® bearings make some of the usual gaging practices impractical. Since very light pressure is sufficient to deflect the thin rings, conventional two-point measurement of bearing bore and outside diameter must not be used. Air gages of the open jet type, or other proximity devices, must be used to hold error from distortion to an acceptable level. Measurements must be made at enough points to yield a true average size, which may not be the mean of the maximum and minimum measurement. A REALI-SLIM® bearing may be out-of-round in the free state^① more than the ABMA tolerance for its precision class. This presents no problem since the races will conform readily to a round shaft diameter and housing bore.

To determine the true runout of each race, by excluding the effect of out of roundness, measurement is made of variation in individual wall thickness. This is schematically illustrated in Figure 5-1. The indicator must contact the raceway at the ball or roller contact, and must be properly positioned for the particular runout (axial or radial) being checked.

Measurement of Radial Runout of Type C Inner Race

Figure 5-1



^① As explained in ABMA Standard 26.2

Diametral clearance of REALI-SLIM® bearings is controlled by selective assembly of races and balls following measurement with gages specially designed for this purpose.

Standard inspection and quality control procedures at KAYDON meet the requirements of government procurement agencies and major aerospace industries. However, a certificate of compliance to specifications can be furnished if required.

Installation

To realize the potential accuracy and long life of a REALI-SLIM® bearing, it is important that the installation be properly done in a clean environment. Cleanliness is vital to satisfactory bearing performance. Work surfaces and tools must be free of dirt, chips, and burrs. Disposable wipers or clean, lint-free cloths should be used.

Under no circumstances should a bearing be used as a gage during grinding or machining of mating parts. Just a few grains of grinding grit or chips of metal (soft as well as hard) can seriously damage the precise geometry and finishes of bearing raceways and rolling elements, and are nearly impossible to remove from an assembled bearing.

The shaft and housing should be thoroughly cleaned, special attention being given to holes and crevices which could hold dirt, chips, and cutting oil. Unfinished surfaces of castings should be painted or otherwise sealed. The mounting surfaces for the bearing must be carefully checked, cleaned, and lightly oiled to ease fitting and minimize danger of scoring. Housing bore, shaft diameter, shoulder squareness, and fillet sizes should all be verified.

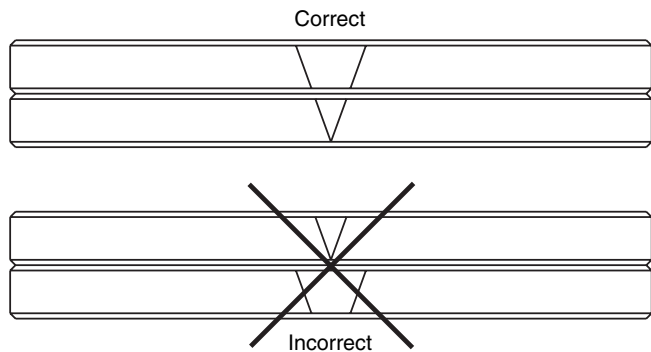
The bearing should not be removed from its protective package until this preparation is complete and it is time for installation.

INSPECTION AND INSTALLATION PROCEDURES FOR REALI-SLIM® THIN-SECTION BEARINGS (continued)

Interference fitting any bearing to the shaft or housing must be carefully done to avoid damage to the bearing. For REALI-SLIM® bearings, the use of temperature difference to expand the outer member is recommended to minimize or eliminate the installation force necessary. To calculate the differential required, use a coefficient of expansion of .000007 inch per inch per degree F for AISI 52100 steel races and .0000056 for AISI 440C races. For a KAYDON Precision Class 1 bearing of 2" bore to be fitted to a steel shaft, the differential required to eliminate all interference between a maximum diameter shaft and minimum diameter bearing is 90°F; for a 4" bore it is 60°F. Either dry heat or hot oil may be used. Electrical resistance tape is convenient for the large bearings. Care must be taken to avoid overheating the bearing. Do not exceed 250°F.

If pressure is necessary, an arbor press should be used with a suitable pusher to apply the force to the full face of the ring being press fitted — never through the bearing, as damage will be done to the balls and raceways.

All duplexed bearings are marked with a single "V" on the bores and outside diameters to indicate the proper relative circumferential position of inner and outer races. This "V" is located at the high points of race eccentricity so that these may be placed at the low points of shaft and housing eccentricity for the canceling effect.



After mounting, the bearings must be given continued protection from contamination until the assembly is closed. Adherence to these procedures will assure a successful installation.

If it is necessary to return a bearing to KAYDON, it should be coated with protective oil and wrapped the same as when shipped from the factory to prevent damage during transit. If bearings are being returned after use for a failure analysis, they should be returned in the as removed condition, since the condition of the part (cleanliness, lubricated condition, etc.) will provide important data for failure analysis.

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Lubrication and Maintenance of REALI-SLIM® Thin-Section Bearings

The lubricant in an anti-friction bearing serves to reduce friction and wear between moving parts, to dissipate heat, and to prevent corrosion of critical surfaces. KAYDON recommends the selection of the proper lubricant be based on an evaluation by the system design engineer of the operating conditions, including at a minimum: rotational speed, type and magnitude of loads, and ambient temperature.

The three types of lubricant commonly used are oil, grease, and dry film or surface treatment.

Oil normally provides more complete lubrication. Because of its liquid state, it provides better coverage of the critical surfaces and assists in dissipating heat more readily, the latter being especially true when circulation and cooling are provided. In high-speed applications where the heating effect is more pronounced, oil is specified (see page 99). Where minimum torque is a requirement, oil will usually provide lower friction values.

Grease offers certain advantages of its own. Because it is more easily retained, the design of bearing housings and seals is simplified. In many applications, the lubricant itself serves to exclude contaminants when used in conjunction with labyrinths or close clearances between the rotating and stationary structures. For the higher speeds within the range suitable for grease lubrication, a channeling type of grease is often selected.

Dry films and surface treatments have been used as bearing lubricants in applications subject to environmental extremes, particularly where

conventional lubricants cannot be tolerated or will not survive. A wide variety of types are available for selection; options include Tungsten disulfide, graphite, and Molybdenum disulfide.

It is important to note that the quantity of lubricant affects bearing performance under certain operating conditions. Only relatively small amounts of lubricant are necessary to reduce friction and wear if a film can be maintained on all contacting surfaces. Where speed is significant, excessive amounts of oil or grease will result in higher operating temperatures, leading to the possibility of early bearing fatigue.

Unsealed bearings are supplied with a coating of preservative-type lubricating oil for the prevention of corrosion during storage. KAYDON recommends that this preservative be removed with clean petroleum solvent prior to lubrication. If the lubricant is not removed, the compatibility of the lubricant with the preservative oil must be confirmed.

In applications where minimum torque is required, the coating should be removed by washing with a clean petroleum solvent followed by immediate relubrication with an oil selected for the application. An option is to have REALI-SLIM® bearings factory lubricated with a commercial grease or oil selected by the customer in order to facilitate installation.

Sealed bearings are packed approximately one-third full with a multi-purpose industrial grease. Exterior surfaces are given a light coating of the same lubricant for protection during storage in the original package.

LUBRICATION AND MAINTENANCE OF REALI-SLIM® THIN-SECTION BEARINGS (continued)

Bearings, with or without seals, can be supplied with optional lubricants. Shown in the accompanying table are some of the greases and oils more frequently specified. Several have been developed to meet the requirements of unusual operating conditions. **Because of this and the variation in cost, it is recommended that lubricants be selected with the assistance of a lubrication expert.**

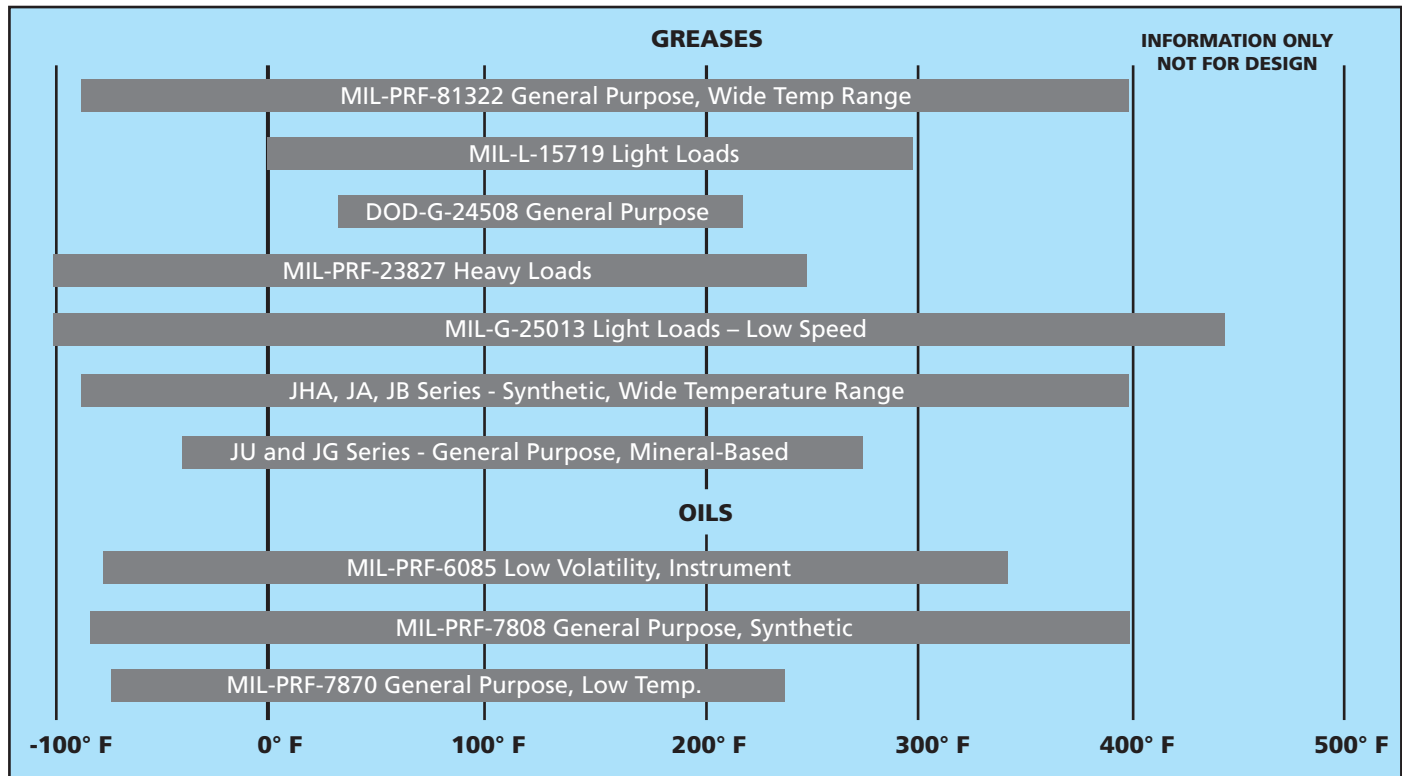
Due to the finite shelf life of any wet lubricant, factory lubricated bearings should not be held more than two years prior to use. Contact KAYDON for refurbishment

instructions for product held beyond two years of receipt.

To realize the full potential of a REALI-SLIM® bearing, KAYDON recommends that the customer’s maintenance instructions and schedules consider the operating conditions and include procedures to assure the bearings are adequately protected against the intrusion of foreign matter of all types, and fresh oil or grease introduced with sufficient frequency to cleanse the bearing and assure adequate lubrication.

Figure 5-2

Lubrication Temperature Ranges



Section 5—Installation & Maintenance