BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 12.02

PRODUCTION PROCESS STANDARD

Lubricating and Storing Aircraft Bearings

Issue 7
- This standard supersedes PPS 12.02, Issue 6.
- Vertical lines in the left hand margin indicate changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for cleaning, lubricating, packaging, storing and handling aircraft bearings.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction and the procedure specified must be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. **do not** supersede the procedure or requirements specified in this PPS. Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Toronto (de Havilland) Environment, Health and Safety Department.

3 References

3.1 MIL-PRF -121 - Barrier Materials, Greaseproof, Waterproof, Flexible, Heat-Sealable.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 31.04 - Degreasing Processes.

3.4 PPS 31.17 - Manual Solvent Cleaning.

3.5 SAE J1966 - Oils, Lubricating, Aircraft Piston Engine (Nondispersant Mineral Oil).

4 Materials and Equipment

4.1 Materials

4.1.1 Lubricating oil and grease as specified by the engineering drawing.

4.1.2 Flexible, greaseproof, waterproof, non-corrosive, heat sealable and non-stretchable barrier material as specified in MIL-PRF-121, used to wrap bearings.

4.1.3 Flexible, greaseproof, waterproof, non-corrosive, moldable and self-adhering (on non-greaseproof side only) barrier material as specified in MIL-PRF-121, used to cover bearings during washing of the aircraft, etc.

4.1.4 Corrosion preventive/fingerprint remover as specified in MIL-C-15074.

4.1.5 Solvents as specified in PPS 31.17.

4.1.6 Engine oil to SAE J1966.

4.2 Equipment

4.2.1 Adaptor for greasing sealed bearings (e.g., Bombardier SD 1491).

5 Procedure

5.1 General

5.1.1 Clean, lubricate, and package bearings as outlined in this specification.

5.1.2 Do not use lubricants which contain graphite for ball and roller bearings.

5.1.3 Ball and roller bearings which are protected with oil do not require cleaning before grease lubrication, provided that the oil has not become contaminated.

5.1.4 Lubricate spherical thrust roller bearings with oil. Grease lubrication must be authorized by Engineering.

5.1.5 It is essential to frequently remove the sludge from the cleaning tanks, replace the solvent, and clean the filters.

5.1.6 Do not use oil or grease to lubricate bearings treated with dry film lubricants by the manufacturer.

5.1.7 Never throw, drop, or pile bearings. If a bearing is accidentally dropped, check it for damage before using.

5.1.8 Do not spin the bearings by using compressed air.

5.1.9 Do not spin unlubricated bearings at high speeds.

5.1.10 Protect all exposed ball and roller bearings with barrier material (see paragraph 4.1.3) before activities such as:

- washing the aircraft with water, steam, or solvent
- paint removal
- spray painting
- watertightness testing

5.2 Sealed Bearings

5.2.1 Sealed bearings are completely covered on both sides through the use of metallic plates and non-metallic seals (e.g. teflon, buna-n), making the entry of dirt and other contaminants very improbable. The sealed bearing is the type most commonly used in the aircraft industry.

5.3 Open Bearings

5.3.1 Open bearings do not have shields, bands, retaining plates, or any other type of seal and are completely open to the entry of contaminants. Therefore, handling, storage and protection of these bearings is very important. The only types of open bearings covered by this standard are tapered roller bearings, such as wheel bearings, and engine bearings.

5.4 Uniball (Two or Three Piece Spherical) Bearings

5.4.1 Uniball bearings consist of an outer race and one ball. The uniball bearing is self aligning and is restricted to applications where the ball revolves less than one revolution within the outer race, such as in push rods, engine mounts, and hinge brackets.

5.4.2 Various lubricating systems are used in the uniball bearing. Most uniball bearings have a teflon and lead impregnated sintered bronze liner or a teflon impregnated cloth liner; others have a dry film lubricated ball.

5.5 Cleaning

5.5.1 Clean the bearings if they are contaminated with swarf, dirt, or any other foreign substance or if they contain contaminated or hardened grease which cannot be forced out during relubrication.

5.5.2 Demagnetize the bearings before cleaning them.

5.5.3 Clean open bearings as follows:

Step 1. Place one layer of bearings flat on the bottom of a wire mesh basket and suspend them in the solvent specified in PPS 31.17 for a minimum of 8 hours (overnight if possible).

Step 2. Thoroughly agitate the bearings in the solvent until they are clean, remove them from the solvent, and allow the excess solvent to drain off.

Step 3. Suspend the bearings in fingerprint remover (see paragraph 4.1.4) for approximately 5 minutes.

Step 4. Drain off the fingerprint remover and immerse the bearings in a solution of the solvent specified in PPS 31.17 and 3 to 5 percent engine oil (see paragraph 4.1.6). Agitate the bearings thoroughly to remove the fingerprint remover.

Step 5. Remove the bearings from the solution. Drain and dry the bearings in an oven (maximum temperature of 250°F).

Step 6. If the bearings do not respond to the soak and wash cleaning method described above, degrease them according to PPS 31.04.

5.5.4 Clean sealed bearings by wiping them with a clean cloth dampened with the solvent specified in PPS 31.17.

5.5.5 Clean uniball bearings by wiping them with a clean, dry cloth. Do not expose uniball bearings to any solvents, since solvents are detrimental to the lubricating properties of the dry film lubricant and the teflon impregnated liner.

5.6 Lubrication

5.6.1 Unless the engineering drawings or orders specifically call for lubrication, do not lubricate uniball bearings.

5.6.2 After cleaning open and sealed bearings, lubricate the bearings using the lubricant specified by the engineering drawing.

5.6.3 If grease is specified for the lubrication of open bearings, pack the bearing with grease to completely cover the rollers or balls. Rotate the bearing by hand to distribute the grease.

5.6.4 Use an adapter (e.g., SD 1491 tool) to grease sealed bearings. Rotate the bearing by hand to ensure complete internal coverage and removal of old lubricant.

5.6.5 Remove excess grease from the bearing.

5.7 Packaging

5.7.1 Individually package all bearings to permanently prevent entry of dust, moisture, and other contaminants. Return the lubricated bearings to their original packaging if the packaging is available and in good condition. If the original packaging is not available, wrap the bearings in uncontaminated greaseproof paper (see Materials section 4.1.2). Neatly fold the paper and secure it with masking tape. Mark each package with the part number, the manufacturer, the MIL spec of the lubricant used, the date of lubrication.

5.7.2 Pack the packages in cardboard boxes and send them for storage. Do not place bearings with different part numbers in the same box.

5.7.3 Issue bearings from the stores on a “first in, first out” basis.

6 Requirements

6.1 Examination Procedure After Processing Bearings

6.1.1 Check the bearings for defects after cleaning and before lubrication. Bearings with any of the following defects are not acceptable:

- Broken parts, cracks, or flakes.
- Corrosion (e.g. rust) or discolouration on the tracks, balls, or rollers.
- “Brinelled”, smeared, fretted or pitted tracks.
- Damaged or missing seals.
- Heat discoloration.
- Bent cages and retainers.
- Galled bearing bores.
- Loose bearing cups.
- Alteration of original dimensions.

6.1.2 Rework bearings with any of the following defects:

- Corrosion (e.g. rust) on a surface other than the tracks, balls, or rollers.
- Loose retainer rivets and tangs in open bearings.

6.1.3 Before packaging, ensure that the bearings have smooth, unrestricted operation by rotating them slowly by hand. If the bearing movement is restricted, reprocess it according to this PPS. If reprocessing does not solve the problem, refer the bearing to the Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

6.2 Examination Procedure Before Installing Bearings

6.2.1 Immediately before installation, visually examine and test all bearings by hand. Bearings with any of the following defects are not acceptable:

- Damaged or ill fitting seals.
- Corrosion (e.g. rust) on the tracks, balls, or rollers.

6.2.2 Rework bearings with rough or restricted turning conditions as specified in this PPS.

6.2.3 If approval is obtained from Liaison Engineering, rework bearings with corrosion (e.g. rust) on the external surfaces.

6.3 Examination Procedure After Installing Bearings

6.3.1 After installation, check all bearings for restricted movement and damage. Reprocess affected bearings according to this PPS.

7 Safety Precautions

7.1 Observe general shop safety precautions when performing the procedure specified herein.

8 Personnel Requirements

8.1 Personnel responsible for cleaning, lubricating and storing aircraft bearings must have a good working knowledge of the applicable procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

9 Installation Practices

9.1 Install bearings using a hardened, tubular, tool grade driving tool. When installing bearings in a housing, use a tool to fit the outer race; when installing bearings on a shaft, use a tool to fit the inner race.

9.2 Never use a tool made out of soft metal for installing bearings since chips may flake off the tool and enter the bearing.