



Advisory Circular

Subject: Installation Eligibility of Substitute or Replacement Bearings

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1.0 INTRODUCTION

This Advisory Circular (AC) is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

The purpose of this Advisory Circular (AC) is to provide guidance on the use of replacement bearings that are equivalent to, but differ from those specified in the approved type design. While this document applies to bearing substitution in general, it is of primary interest with regard to bearings in aircraft instruments.

1.2 Applicability

This document applies to Transport Canada Civil Aviation (TCCA) personnel, delegates, and the aviation industry.

1.3 Description of Changes

This document, formerly Policy Letter (PL) 571-001, Issue 01, has been reissued as AC 571-004. With the exception of minor editorial changes and updated references, the content is unaltered.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

It is intended that the following reference materials be used in conjunction with this document:

- (a) Part I, Subpart 01 of the Canadian Aviation Regulations (CARs)—*General Provisions*;
- (b) Part V, Subpart 73 of the CARs—*Approved Maintenance Organizations*;
- (c) Standard 571—*Maintenance*;
- (d) Federal Aviation Administration (FAA) Technical Standard Order (TSO) C148, 1997-09-26—*Aircraft Mechanical Fasteners*;
- (e) FAA TSO C149, 1998-04-24—*Aircraft Bearings*;
- (f) FAA Order 8150.1B, 2002-05-12— *Technical Standard Order Program*.

2.2 Cancelled Documents

As of the effective date of this document, the following document is cancelled:

- (a) Policy Letter (PL) 571-001, Issue 01, 2004-10-01—*Installation Eligibility of Substitute or Replacement Bearings*.

3.0 BACKGROUND

- (1) This document defines the criteria under which TCCA would allow the replacement or substitution of bearings in aeronautical products, including bearings in various instruments, as an overhaul activity.
- (2) Bearings may be produced under or in conjunction with a variety of design standards including Technical Standard Orders (TSOs), Military Specifications, Military Standards, American National Standards Institute/American Bearing Manufacturers Association (ANSI/ABMA) and other design criteria including proprietary original equipment manufacturer (OEM) data.

- (3) While bearings may be produced under these criteria, for example under a TSO Authorization (TSOA), that in and of itself does not automatically confer approval for the installation on an aeronautical product of a part meeting the same TSO but which has been manufactured by a different manufacturer. This is because two parts of the same size that meet a part TSO may have widely different performance characteristics, which may be allowed under the TSO. The specific performance of the aeronautical product may depend on that specific characteristic whereas a part meeting a slightly different characteristic, but still compliant with the TSO, may not function.
- (4) Generally, installation of replacement or substitute parts, including bearings, may only be done in accordance with the appropriate technical data as identified in Section 571.06 of Standard 571, which may include approved data, specified data or acceptable data. Approved data or specified data is necessary in the case of major modifications or major repairs. Data acceptable to the Minister is necessary for all other modifications or repairs, which are referred to as minor in this document.
- (5) This document provides guidance in determining those bearing replacements or substitutions that may be considered a major repair or a minor repair, and on the standards that the Minister will apply in determining whether such repairs are acceptable.

4.0 SUBSTITUTION OF BEARINGS CONSTITUTING MAJOR REPAIR

4.1 General

- (1) Section 101.01 of the CARs defines a major repair, in part, as one that “.... causes the aeronautical product to deviate from the type design defined by the type certificate, where the deviation from the type design has other than a negligible effect on the weight and centre-of-gravity limits, structural strength, performance, power plant operation, flight characteristics or other qualities affecting the product’s airworthiness ...”
- (2) Where a bearing is replaced by an equivalent bearing, which is not specified in the approved type design, clearly a change has taken place. The determination of whether that change is considered major or not, will depend primarily upon whether the change can be considered negligible. For the purpose of this document, that will depend upon the criticality of the bearing as a part of the overall design of the aeronautical product.
- (3) It must be noted that an aircraft bearing that meets the requirements of TSO C149 may not be used in a critical application.
- (4) Bearings are considered critical if their failure could appreciably affect:
 - (a) aircraft performance, flight characteristics;
 - (b) operating or maintenance limitations/procedures; or
 - (c) could introduce failures, malfunctions or otherwise create an unsafe condition for the aircraft that would reduce the capability of the aircraft or the ability of the crew to cope with adverse operating conditions or would prevent the continued safe flight and landing.
- (5) Replacement of such bearings will constitute a major repair and must be installed in accordance with data “approved” by the Minister.

4.2 Examples of Replacements Constituting a Major Repair

Some examples of bearing replacements, which would constitute a major repair, are:

- (a) bearings in the engine control system(s);
- (b) bearings in the primary flight control system(s);
- (c) rotorcraft mast, main rotor and tail rotor system bearings; and
- (d) rotating bearings in engines and transmissions.

4.3 Methods of Approval

Bearing replacement or substitution, constituting a major repair or modification may only be done where approved through the issuance of a:

- (a) Supplemental Type Certificate (STC);
- (b) Part Design Approval (PDA); or
- (c) (FAA) Part Manufacturer Approval (PMA) for the replacement part.

5.0 SUBSTITUTION OF BEARINGS CONSTITUTING MINOR REPAIR

5.1 General

- (1) The replacement of bearings in applications other than those described in Section 4.0 of this AC may be considered minor repairs, and need not be installed in accordance with data "approved" by the Minister. However, such replacement must still be installed in accordance with data "acceptable" to the Minister.
- (2) The substitution of a critical bearing that bears a different part number, but is otherwise identical to that specified in the type design, is not considered a major repair or modification where the installer obtains written affirmation of the acceptability of the substitution from the original bearing manufacturer of the part. The statement obtained must confirm that, not only is the bearing physically identical as delivered from the bearing manufacturer, but also that the bearings identified in the approved type design are not subject to any additional selection criteria or other value added processes prior to installation. See the example statement in section 5.3 (2) of this AC.
- (3) Approved Maintenance Organizations (AMOs) who intend to install substitute bearings must describe their procedures for control of these substitutions (for both major and minor repairs, as applicable) in their Maintenance Policy Manuals (MPMs) and obtain approval for the procedures under the normal MPM amendment process in accordance with section 573.10 of the CARs.

5.2 Examples of Replacements constituting a Minor Repair:

Some examples of bearing replacements, which would constitute a minor repair, are:

- (a) bearings in gyroscopic instruments; and
- (b) bearings in landing gear wheel assemblies.

5.3 Methods of Approval

- (1) To be considered acceptable to the Minister, bearing replacements or substitutions that constitute a minor repair, must be done in accordance with recognized industry practices. The substitution must be documented in the applicable technical record and the installer is responsible for ensuring that the characteristics of the replacement bearing are equivalent to those of the original part in all relevant aspects. This assurance may be achieved by:

- (a) direct comparison and test as described in the MPM of an AMO; or
- (b) obtaining a statement from the bearing manufacturer that the bearing is equivalent to that of the original part in the aeronautical product.

- (2) An example statement would be:

"Over-Bearing, Inc. produces bearings for Straight-Flight Aircraft Instrument Company. Over-Bearing part number ABC is the same part, that Over-Bearing, Inc. supplies to Straight-Flight Aircraft Instrument Company as their part number GHI. Over bearing Inc. is not aware of any additional screening or modification programs conducted on these bearings by Straight-Flight Aircraft Instrument Company."

- (3) If the bearing is supplied by the original bearing manufacturer under a specific part number, and the bearing is then renumbered by the instrument manufacturer, it is the installer's responsibility to determine whether the instrument manufacturer has a screening or modification program that results in the bearings meeting tighter tolerances or being altered in some other manner. If such a program exists, then the substituted bearings must be subject to an equivalent process.
- (4) An example of a screening process is: A manufacturer may conduct additional tests on a batch of parts received from the bearing manufacturer to ensure that those parts conform to a tighter dimensional or operational tolerance than those of the bearing manufacturer.
- (5) An example of a modification process is: A manufacturer may replace the type of lubricating grease in the bearing from that which was delivered by the bearing manufacturer.

6.0 CONTACT OFFICE

For more information, please contact the:

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Suggestions for amendment to this document are invited, and should be submitted via the Transport Canada Civil Aviation Issues Reporting System (CAIRS) at the following Internet address:

<http://www.tc.gc.ca/wcms-sgcw/civilaviation/cairs-755.htm>

or by e-mail at: CAIRS_NCR@tc.gc.ca

Original signed by D. B. Sherritt on 2009-09-18

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