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AEROSPACE RECOMMENDED PRACTICE

SAE ARP5483/6

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Rolling Element Bearing Test Method for Dimensional Stability

RATIONALE

ARP5483/6 is a conversion of the MIL-STD-2159 (which had only been issued previously in draft form).

1. SCOPE

This test method outlines the recommended procedure for performing dimensional stability tests on rolling element bearings used in airframe applications. Bearings covered by this document shall be antifriction ball bearings and spherical roller bearings with through-hardened outer rings.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 ANSI/NCSL Publications

Available from NCSL, 1800 30th Street Suite 305B, Boulder, CO 80301-1026.

ANSI/NCSL Z540-1 Calibration Laboratories and Measuring and Test Equipment- General Requirements

2.2 ISO Publications

Available from International Organization for Standardization, 1, rue de Varembe, Case postale 56, CH-1211 Geneva 20, Switzerland, Tel: +41-22-749-01-11, www.iso.org.

ISO 10012 Quality Assurance Requirements for Measuring Equipment

3. GENERAL REQUIREMENTS

3.1 Test Apparatus

3.1.1 Measurement Equipment

Standard gage blocks or masters and an indicator, which together are capable of measuring a dimensional change of 0.0001 in/in.

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3.1.2 Thermal Control Equipment

Oven and freezer chests are required and must be capable of maintaining the applicable temperatures for the required period of time.

3.2 Specimen

3.2.1 Bearings for Dimensional Stability Test

Bearings may be tested as received in which case only new bearings shall be used. It is also acceptable to disassemble the bearing and perform the test on only the outer ring.

3.2.2 Quantity

The number of test specimens shall be as specified in the referencing document.

3.2.3 Disposition of Test Bearings

Bearings tested per this method shall not be put into service.

4. DETAILED REQUIREMENTS

4.1 Measurement 1

The outside diameter of each test bearing shall be measured at two reference points 90 degrees apart using a 2-point gage. The locations of the measurements shall be noted such that they can be easily repeated.

4.2 High Temperature Stabilization

The test bearings shall be heated and maintained at the temperature specified in the applicable bearing document. Unless otherwise stated, the tolerance of the temperature is +10 °F/-0 °F and the time is a minimum. Successful testing at temperatures above the specified values shall not be cause for failure.

4.3 Measurement 2

Upon completion of the heating cycle, allow the bearings to soak at room temperature until they have cooled fully and their temperature has stabilized. Measure the OD of the bearing again at the reference points and record the readings. If any of the OD readings show a dimensional change from the previous measurement of more than that specified in the applicable bearing document, the bearing is unacceptable.

4.4 Low Temperature Stabilization

The test bearing shall be cold soaked and maintained at the temperature specified in the applicable bearing document. Unless otherwise stated, the tolerance of the temperature is +0 °F/ -10 °F and the time is a minimum.

4.5 Measurement 3

Upon completion of the cooling cycle, allow the bearings to soak at room temperature until they have warmed fully and their temperature has stabilized. Measure the OD of the bearing again at the reference points and record the readings. If any of the OD readings show a dimensional change from the previous measurement of more than that specified in the applicable bearing document, the bearing is unacceptable.

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5. DOCUMENTATION

5.1 Test Parameters

5.1.1 Specific test requirements are given in the applicable document. Test parameters to be recorded shall include the following as applicable:

a. Blueprint dimensions for the test bearing

b. Shaft and test fixture dimensions and configuration

c. Durations of high and low temperature cycles

d. Incremental size change to determine pass/fail

5.1.2 If test parameters are not specified in the referencing document, use the following:

a. High temperature stabilization: 350 °F for 300 h

b. Low temperature stabilization: -65 °F for 4 h

c. Failure criteria: Size change of more than 0.0001 in/in

5.2 Test Data

5.2.1 Data Requirements

Specific requirements may be called out in the applicable specification. The following data shall be recorded as a minimum:

a. Initial OD dimensions for each reference location of each test specimen

b. Temperature and time for each stabilization cycle

c. OD dimensions for each reference location of each test specimen after each stabilization cycle

d. Incremental size change of each measurement

5.2.2 Test Records

A log shall be maintained during the test and shall include a record of start and stop times, maintenance performed on the test facility, and any other pertinent information relating to the test. Data sheets shall be filled out when data is taken during the test. Temperature control charts shall be included or temperature readings shall be taken at specific intervals and the records maintained to support reporting of the test results.

5.2.3 Test Report

The recorded data shall be summarized in report form and shall contain the following:

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5.2.3.1 Bearing Description

a. Bearing part number

b. Lot identification number

c. Manufacturer's identification

d. Dated drawing completely describing the test bearing including the dimensions and materials

5.2.3.2 Test Equipment Description

a. Model numbers

b. Serial numbers

c. Calibration dates

5.2.3.3 Measuring Equipment Description

a. Model number

b. Serial number

c. Calibration date

5.2.3.4 Test Procedures and Results

a. Procedure followed

b. Data sheets

c. All inspection results

d. Any test malfunctions or interruptions and explanations.

e. Certification of the data presented and that no data has been omitted.

6. NOTES

6.1 Intended Use

This test method is intended to provide a means for evaluating the dimensional stability of rolling bearings. Accurate measurement procedures are very important as size change can be less than 0.0001 in.

6.2 Method of Reference

This test method is intended to be referenced in general and in detailed specifications, standards, and drawings for antifriction airframe bearings. Specific test and data requirements are given in the applicable document. The following note shall be used to reference this test method:

NOTE: The bearings shall be tested in accordance with ARP5483/6. The slash number refers to the specific test method.

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