SAE Aerospace
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AEROSPACE RECOMMENDED PRACTICE

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Plain Bearing No-Load Rotational Breakaway Torque Measurement

1. SCOPE:

This test method provides a procedure for measuring no-load rotational breakaway torque of self-lubricating spherical bearings.

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 Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

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

3. DEFINITIONS:

NO-LOAD ROTATIONAL BREAKAWAY TORQUE: No-load rotational breakaway torque of a spherical bearing is the torque required to initiate rotation of the ball with respect to the race with no radial or axial loads applied.

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4. GENERAL REQUIREMENTS:

4.1 Test Apparatus:

4.1.1 The test fixture shall provide a means of holding the outer ring of the bearing fixed while rotating the ball about the bearing axis.

4.1.2 The test fixture shall provide a means of holding the outer ring in such a manner as to minimize bearing distortion and the resultant effect on bearing torque.

4.1.3 The test fixture shall provide a means of rotating the ball without excessive clamping forces or otherwise distorting the ball so as to affect the bearing torque.

4.1.4 The test fixture shall provide a means of measuring the rotational torque at which ball rotation is initiated. The accuracy of the torque measuring device shall be ±5% of the indicated value.

4.1.5 Calibration of the test apparatus shall be in accordance with ANSI-NCSL Z540-1.

4.2 Temperature:

Unless otherwise specified, temperature of the test area shall be 75 °F ± 10 °F.

4.3 Relative Humidity:

Relative humidity of the test area shall not exceed 75%.

5. DETAILED REQUIREMENTS:

5.1 Stabilize the test bearing at the temperature and relative humidity of the test area.

5.2 Place the test bearing in the test fixture and apply the holding feature to the outer ring.

5.3 Unless otherwise specified, misalign the ball in two mutually perpendicular planes and rotate through two to three revolutions immediately prior to testing. This may be accomplished by hand or with the assistance of an appropriately sized test shaft inserted in the bore of the bearing.

5.4 Gradually apply torque to the ball until rotation begins.

5.5 Record the torque at which ball rotation is initiated.