



AEROSPACE RECOMMENDED PRACTICE

Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

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BALL TYPE SLAVE BEARINGS FOR ROTOR SUPPORT IN DYNAMIC BALANCING MACHINES

*propulsion systems
engine ground support*

1. PURPOSE

This Aerospace Recommended Practice (ARP) defines a series of ball bearings which are specifically designed to support the rotor in a dynamic balancing machine. By establishing certain bearing sizes the number of required balancing machine support adapters will be reduced. The intent is that each size bearing identified by its outside diameter and width will be capable of accommodating any bore diameter within the specified range of that size.

2. SCOPE

This ARP specifies both the nominal dimensions and the tolerances for a series of ball bearings with semifinished inside diameters which are suitable for supporting gas turbine rotating components in dynamic balancing machines.

3. BACKGROUND

- 3.1 In general, the least expensive and most convenient way to support a rotor in a horizontal balancing machine is by means of twin roller carriages. Only if special circumstances make this inadvisable should slave bearings or other alternatives be used.
- 3.2 Slave bearings reduce the possibility of journal scoring and usually eliminate the need for positive means of axially locating the rotor.
- 3.3 At times the engine bearing is used for balancing; however, most engine bearings have more internal clearance (to provide for expansion in the hot engine) than is advisable for use on a balancing machine. Moreover, a large supply of balancing machine support adapters would be required to accommodate the many engine bearing sizes in use. Also, some engine bearings may require very tight inner race fits; such fits are not necessary for slave bearings and thus risk of shaft damage can be avoided by use of slave bearings.
- 3.4 Eccentricity in all rolling element bearings constitutes a potentially significant error source for the balance of a rotor. For instance, the engine bearing and the slave bearing may have different eccentricities between the inner race and the bore and also different angular positions of these eccentricities. Thus, the axes of rotation in the balancing machine and engine assembly will not coincide. This in turn may cause a substantial residual unbalance in the engine assembly. If the inner race eccentricities of both the slave bearing and the engine bearing have the same angular positions, the unbalance of a perfectly balanced rotor is the result of the difference in eccentricities of the slave bearing and the engine bearing rather than the eccentricity of the engine bearing alone.

4. APPLICABLE DOCUMENT

SAE ARP 587A - Balancing Equipment for Jet Engine Components - Compressors and Turbine-Rotating Type - For Measuring Unbalance in One or More Than One Transverse Planes

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5. REQUIREMENTS

5.1 Workmanship: In general material quality, heat treating procedure, forging, machining, handling and preparation for shipping shall be equivalent to commercially processed bearings supplied for the aircraft gas turbine industry.

5.2 Materials:

5.2.1 Materials shall conform to customary industry standards for high precision aircraft quality bearings and should be subjected to testing and controls applicable to equivalent bearings of conventional sizes.

5.2.2 The metal used for balls and rings should be homogeneous in structure, free from pipes, seams, laminations, excessive inclusion of nonmetallic impurities and such other internal defects as would render the material unsuitable for the intended purpose.

5.2.3 Hardness:

BALLS RC58-62 or equivalent
RINGS RC58-62 or equivalent

The hardness should favor the rolling elements.

5.3 Dimensions and Tolerances:

5.3.1 Dimensions and tolerances shall be equivalent to ABEC-7 except as shown in Tables I and II.

5.3.2 Outer ring dimensions shall conform to specifications shown in Table II which covers the range of sizes generally used with machine types described in ARP 587A.

5.3.3 Inner ring range of sizes shall conform to Table II, but final bore finish, size and tolerance are to be specified by user.

5.3.4 Bearing width shall conform to Table II.

5.3.5 Ball dimensions or other internal features of bearings not covered by ABEC-7 or Tables I and II shall follow design practice appropriate for comparable bearings supplied to the aircraft gas turbine industry.

PREPARED BY
SAE COMMITTEE EG-1, AEROSPACE PROPULSION SYSTEMS SUPPORT EQUIPMENT