

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION

R 1002

ROLLING BEARINGS
AIRFRAME BEARINGS

INTRODUCTION, GENERAL,
BOUNDARY DIMENSIONS, TOLERANCES, PERMISSIBLE LOAD

1st EDITION

March 1969

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Printed in Switzerland

Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1002, *Rolling bearings – Airframe bearings – Introduction, General, Boundary dimensions, Tolerances, Permissible load*, was drawn up by Technical Committee ISO/TC 4, *Rolling bearings*, the Secretariat of which is held by the Sveriges Standardiseringskommission (SIS).

Work on this question led, in 1963, to the adoption of three Draft ISO Recommendations.

In October 1963, these Draft ISO Recommendations (Nos. 474, 558 and 559) were circulated to all the ISO Member Bodies for enquiry.

Draft ISO Recommendation No. 474, on which the part of this ISO Recommendation dealing with dimensions is based, was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Hungary	Sweden
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Chile	Korea, Rep. of	United Kingdom
Czechoslovakia	Netherlands	U.S.S.R.
Germany	Romania	Yugoslavia
Greece	Spain	

One Member Body opposed the approval of the Draft :

France

Draft ISO Recommendation No. 558, on which the part dealing with internal clearance is based, was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Hungary	Switzerland
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France	Romania	Yugoslavia
Germany	Spain	
Greece	Sweden	

No Member Body opposed the approval of the Draft.

Draft ISO Recommendation No. 559, on which the part dealing with static load ratings is based, was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	Greece	Sweden
Austria	Hungary	Switzerland
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Chile	Japan	United Kingdom
Colombia	Korea, Rep. of	U.S.A.
Czechoslovakia	Netherlands	U.S.S.R.
France	Romania	Yugoslavia
Germany	Spain	

No Member Body opposed the approval of the Draft.

The three Drafts were combined by the ISO/TC 4 Secretariat into a single document and submitted by correspondence to the ISO Council, which decided, in March 1969, to accept them as an ISO RECOMMENDATION.

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ROLLING BEARINGS
AIRFRAME BEARINGS

INTRODUCTION, GENERAL,
BOUNDARY DIMENSIONS, TOLERANCES, PERMISSIBLE LOAD

INTRODUCTION

This ISO Recommendation relates to airframe bearings. An airframe is defined here as the general structure of an aircraft, and includes its control surfaces and all flaps and doors and their respective mechanisms.

Airframe bearings are designed to be subjected under load to slow rotations or oscillations only.

1. GENERAL

1.1 Scope

This ISO Recommendation is confined to bearings other than tapered roller bearings, used in airframes, as distinct from those used in connection with power plants, auxiliary drives and instruments in aircraft. Both metric and inch series bearings are included in this ISO Recommendation because of established usage in the aircraft industry.

These bearings are usually made without cage and are filled with balls or rollers, except for those in Table 12. All bearings are shielded or sealed, except those in Table 12. Except for those in Tables 5 and 12, the bearings have a projecting inner ring. The bearings are normally supplied adequately charged with suitable grease, and the exterior surfaces of the bearings may be protected by the same grease.

Because of the following design requirements, it is generally not possible to select standard bearings from ISO Recommendation R 15*, *Rolling bearings – Radial bearings – Boundary dimensions – General plan*, for airframe applications but, in the case of metric bearings, the basic dimensions of the above-mentioned ISO Recommendation have been used where possible.

• 2nd edition – 1968.

1.2 Essential characteristics

The lubricant and the seals should be capable of withstanding temperatures ranging from -55 to $+121^{\circ}\text{C}$ without losing their effectiveness.

NOTE. — Special operational conditions may necessitate wider extremes of temperature, in which case special greases and/or sealing materials may be required.

Bearings should be capable of withstanding repeated loads of variable intensity, normally without making a complete revolution. Bearings are generally made with a projecting inner ring in order to make it easier to assemble the bearings in position without adding washers.

1.3 Shields and seals

- (a) A shielded bearing is a bearing in which the rolling elements and raceways are enclosed, except for a small clearance, between the shield and the opposite ring. Bearings in Tables 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 17, 18 and 19 may be provided with shields.
- (b) A sealed bearing is a bearing in which the rolling elements and raceways are enclosed by a flexible seal rubbing on one ring, the sealing element being secured to the other ring. Bearings in Tables 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15 and 16 may be provided in a fully sealed condition.

Choice of shields or seals will be governed by the nature of the particular application since the sealed bearing gives improved protection at the expense of greater friction.

1.4 Plating

External steel surfaces of the bearing may be protected by cadmium plating, or provided with an approved alternative surface protection. The thickness of cadmium plating should not be less than 0.008 mm (0.0003 in) nor more than 0.018 mm (0.0007 in). Treatments other than cadmium plating should be the subject of agreement between purchaser and manufacturer.

The surfaces to be plated are detailed in the tables for inch series bearings. For the metric series bearings attention is drawn to the note under Table 20.

1.5 Basic static load rating

In order that airframe bearings made by different manufacturers and designated with identical complete bearing numbers according to ISO Recommendation R 300, Part III : *ISO Identification Code for rolling bearings – Group V : Airframe bearings*, may be made interchangeable not only dimensionally but also functionally, every bearing should have a certain minimum basic static load rating, C_0 . Therefore, no bearing should be coded as an ordinary airframe bearing unless its C_0 value is equal to or greater than the value indicated in this ISO Recommendation. In cases where the carrying properties of the basic static load rating C_0 differ from those of ordinary airframe bearings made of regular hardened rolling bearing steel, this should be shown by a particular supplementary code number or symbol.

Definitions, symbols and methods of evaluating basic static load ratings are given in ISO Recommendation R 76, *Ball and roller bearings – Methods of evaluating static load ratings*.

The values of the basic static load rating C_0 demanded from ordinary airframe bearings made of regular hardened rolling bearing steel are indicated in Tables 1 to 19 inclusive, in section 2.

The use of special materials, such as corrosion-resisting steels or heat-stabilized steels, may affect the load carrying capacity and may call for special tests. These tests should be agreed between the manufacturer and the user.

2. BOUNDARY DIMENSIONS

2.1 General

The boundary dimensions of the bearings are given in Tables 1 to 19. The dimensions of plated parts are measured after plating.

A chamfer dimension of a bearing ring is the distance in radial and axial directions from the imaginary sharp ring corner, over which ring material is removed (see Fig. 1, 2 and 3).

The exact form of radiusing or chamfering at the corners is not specified but it should be somewhere between a chamfer with co-ordinates r maximum and a perfectly circular arc of r minimum tangential to the face and to the cylindrical bore or outside surface. Where no chamfer dimension at a corner is indicated, the sharp edge is removed.

The values for angles δ indicated under Tables 10, 11, 12, 13, 14, 15 and 16 are to be regarded by the user as maxima. For the bearing manufacturer these values should be regarded as minima, so that in service the angles shown may be achieved normally without causing any damage to the parts of the bearing.