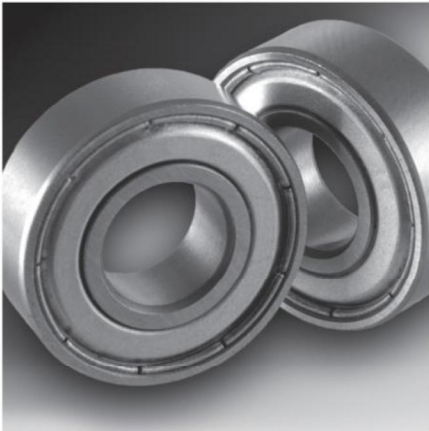


AMERICAN NATIONAL STANDARD
ABMA Standard



Aerospace -- Airframe rolling bearings: ball and spherical roller bearings -- Technical specification

Sponsor

**American Bearing
Manufacturers Association**

**ABMA/ISO 14190-2010
(Identical Adoption of ISO 14190:1998)**

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ABMA FOREWORD (This foreword is not part of ABMA/ISO 14190-2010.)

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The text is approved as an International Standard if a two-thirds majority of the P (participating)-members of the TC/SC are in favor and not more than one-quarter of the total number of votes cast are negative.

International Standard 14190-2010 was prepared by Technical Committee ISO/TC 4, Rolling Bearings / Subcommittee 4, Tolerances, tolerance definitions and symbols (including GPS).

This standard was processed and approved for submittal to ANSI for national adoption by Accredited Standards Committee B3. Committee approval of the national adoption of this standard does not necessarily mean that all committee members voted for its adoption.

Suggestions for the improvement of this standard gained through experience with its use will be welcomed. These suggestions should be sent to:

ASC B3 Secretariat
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INTERNATIONAL STANDARD

**ISO
14190**

First edition
1998-05-01

Aerospace — Airframe rolling bearings: ball and spherical roller bearings — Technical specification

*Aéronautique et espace — Roulement pour structures d'aéronefs:
roulements à billes et à rotule — Spécifications techniques*



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Printed in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14190 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 15, *Airframe bearings*.

Annexes A to H form an integral part of this International Standard.

Introduction

In 1986, ISO TC 4, *Rolling bearings*, approved a new work item to revise the International Standard on airframe bearings, ISO 1002:1983, *Rolling bearings — Airframe bearings — Characteristics, boundary dimensions, tolerances, static load ratings*. The work item was assigned to ISO TC 4, *Rolling bearings* and TC 20, *Aircraft and space vehicles*, Joint Working Group on airframe bearings.

Later that same year, ISO TC 4/TC 20 JWG on airframe bearings agreed that a technical specification for the procurement of airframe bearings should be prepared as part of the revision process.

The work item was subsequently transferred to ISO TC 20/SC 15, *Airframe bearings*.

As a result, this International Standard has been developed for the procurement of airframe ball and roller bearings and is supplemented with International Standards for each bearing type.

14190:1998(E)

Aerospace — Airframe rolling bearings: ball and spherical roller bearings — Technical specification

1 Scope

This International Standard specifies the required characteristics, inspections and tests, quality assurance and conditions for qualification, permissible static loads, acceptance and delivery conditions for rigid and self-aligning airframe ball and spherical roller bearings. These bearings are designed to withstand, under load, slow rotations and small oscillations only.

It is applicable to all airframe ball and spherical roller bearings in the referenced International Standards or in a design specification.

The fact that a rolling bearing is not included in this International Standard does not preclude its use in airframe applications.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions*.

ISO 2859-1:—¹⁾, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection*.

ISO 4288:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*.

ISO 5593:1997, *Rolling bearings — Vocabulary*.

ISO 6507-1:1997, *Metallic materials — Vickers hardness test — Part 1: Test Method*.

ISO 6508-1:—²⁾, *Metallic materials — Rockwell hardness test (scales A, B, C, D, E, F, G, H, K, N, T) — Part 1: Test method*.

ISO 9001:1994, *Quality systems — Model for quality assurance in design, development, production, installation and servicing*.

1) To be published. (Revision of ISO 2859-1:1989)

2) To be published. (Revision of ISO 6508:1986 and ISO 1024:1989)

ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing.*

ISO 9003:1994, *Quality systems — Model for quality assurance in final inspection and test.*

ISO 14191:1998, *Aerospace — Airframe spherical roller bearings, single-row, self-aligning, diameter series 3 and 4 — Metric series.*

ISO 14192:1998, *Aerospace — Airframe spherical roller bearings, single-row, self-aligning, shielded, intermediate duty — Metric series.*

ISO 14193:1998, *Aerospace — Airframe spherical roller bearings, single-row, self-aligning, sealed, extended inner ring, intermediate duty — Inch series.*

ISO 14194:1998, *Aerospace — Airframe spherical roller bearings, double-row, self-aligning, sealed, extended inner ring, heavy duty — Inch series.*

ISO 14195:1998, *Aerospace — Airframe spherical roller bearings, double-row, self-aligning, sealed, torque tube design, light duty — Inch series.*

ISO 14196:1998, *Aerospace — Airframe spherical roller bearings, double-row, self-aligning, sealed, plain inner ring, heavy duty — Inch series.*

ISO 14197:1998, *Aerospace — Airframe spherical roller bearings, single-row, self-aligning, sealed, intermediate duty — Inch series.*

ISO 14201:1998, *Aerospace — Airframe ball bearings, double-row, self-aligning, diameter series 2 — Metric series.*

ISO 14202:1998, *Aerospace — Airframe ball bearings, single-row, rigid, diameter series 0 and 2 — Metric series.*

ISO 14203:1998, *Aerospace — Airframe ball bearings, single-row, rigid, diameter series 8 and 9 — Metric series.*

ISO 14204:1998, *Aerospace — Airframe ball bearings, double-row, rigid, diameter series 0 — Metric series.*

ISO 14206:1998, *Aerospace — Airframe ball bearings, single-row, rigid, sealed, light duty — Inch series.*

ISO 14207:1998, *Aerospace — Airframe ball bearings, single-row, rigid, precision, sealed, light duty — Inch series.*

ISO 14208:1998, *Aerospace — Airframe ball bearings, single-row, rigid, sealed, intermediate duty — Inch series.*

ISO 14209:1998, *Aerospace — Airframe ball bearings, single-row, rigid, precision, sealed, intermediate duty — Inch series.*

ISO 14210:1998, *Aerospace — Airframe ball bearings, single-row, rigid, sealed, torque tube design, light duty — Inch series.*

ISO 14211:1998, *Aerospace — Airframe ball bearings, single-row, rigid, precision, sealed, torque tube design, light duty — Inch series.*

ISO 14212:1998, *Aerospace — Airframe ball bearings, single-row, rigid, sealed, torque tube design, extra-light duty — Inch series.*

ISO 14213:1998, *Aerospace — Airframe ball bearings, single-row, rigid, precision, sealed, torque tube design, extra-light duty — Inch series.*

ISO 14214:1998, *Aerospace — Airframe ball bearings, double-row, rigid, sealed, heavy duty — Inch series.*

ISO 14215:1998, *Aerospace — Airframe ball bearings, double-row, rigid, precision, sealed, heavy duty — Inch series.*

ISO 14216:1998, *Aerospace — Airframe ball bearings, double-row, self-aligning, sealed, heavy duty — Inch series.*

ISO 14217:1998, *Aerospace — Airframe ball bearings, double-row, self-aligning, precision, sealed, heavy duty — Inch series.*

ISO 14218:1998, *Aerospace — Airframe ball bearings, single-row, self-aligning, sealed, heavy duty — Inch series.*

ISO 14219:1998, *Aerospace — Airframe ball bearings, single-row, self-aligning, precision, sealed, heavy duty — Inch series.*

ISO 14220:1998, *Aerospace — Airframe ball bearings, single-row, self-aligning, sealed, light duty — Inch series.*

ISO 14221:1998, *Aerospace — Airframe ball bearing, single-row, self-aligning, precision, sealed, light duty — Inch series.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5593, ISO 1132, and the following apply.

3.1

delivery batch

quantity of rolling bearings shipped or to be shipped which have the same identity block, but may come from different production batches

3.2

sealed rolling bearings

bearings in which the rolling elements and raceways are protected by contact seals (i.e., seals fitted to one ring and extending to the other ring with which they make sliding contact)

3.3

shielded rolling bearings

bearings in which the rolling elements and raceways are protected by shields fitted to one ring and extending to the other ring with which they have a small clearance

3.4

surface discontinuities

imperfections which include, but are not limited to, the following:

3.4.1

crack

break in the material which may extend in any direction and which may be intercrystalline or transcrystalline in character

3.4.2**open surface defect**

surface defect resulting from a tearing of the metal, such as a tool mark, score or scratch

3.4.3**lap**

surface defect where particles of metal or sharp edges are folded over and then rolled or forged into the surface

3.4.4**seam**

unwelded fold which appears as an open defect in the material

3.5**starting torque without load**

maximum torque required to start rotation of a ring about the other

NOTE — Due regard should be given the fact that bearings without retainers or separators are not likely to have absolute freedom of rotation because of adjacent rolling elements rubbing each other.

3.6**permissible static loads****3.6.1****permissible static radial load**

maximum static radial load which can be applied to the bearing without impairing its subsequent operation

3.6.2**permissible static axial load**

maximum static axial load which can be applied to the bearing without impairing its subsequent operation

3.6.3**ultimate static radial load**

maximum static radial load which can be applied to the bearing without causing cracks or ruptures in any of the component parts

NOTE — The ultimate static radial load is a load equal to 1,5 times the permissible static radial load.

3.6.4**ultimate static axial load**

maximum static axial load which can be applied to the bearing without causing cracks or ruptures in any of the component parts

NOTE — The ultimate static axial load is a load equal to 1,5 times the permissible static axial load.

3.7**diagonal internal clearance**

value of the total tilt of inner ring in relation to outer ring

4 Symbols

For the purposes of this International Standard, the symbols given in ISO 1132 and in the appropriate referenced International Standard apply.

5 Characteristics, requirements, inspections and test methods

Characteristics, requirements, inspections and test methods are given in table 1.

Table 1

Sub-clause	Characteristics	Requirements	Inspection and test methods	Q ¹⁾	A ¹⁾
5.1	Materials	Shall conform with product standards or design documentation.	Chemical analysis or certificate of conformity issued by the manufacturer.	X	X
5.2	Dimensions and tolerances				
5.2.1	At ambient temperature (20 °C ± 1 °C)	Shall conform with product standards or design documentation.	Suitable measuring instruments	X	X
5.2.2	Dimensional stability	Permissible change 0,1 µm max. per 1 mm of diameter.	See annex A	X	
5.3	Mass	Shall conform with product standards or design documentation.	Suitable methods	X	
5.4	Identification marking	Shall conform with product standards or design documentation. Shall be legible and shall not damage the material or impair the performance of the bearing.	Visual examination	X	X
5.5	Surface appearance ²⁾	Shall be free of surface discontinuities liable to distort their characteristics and lessen their endurance.			
5.5.1	Unassembled rings and rolling elements		Magnetic, dye penetrant or eddy current inspection.	X	
5.5.2	Assembled bearings		Visual inspection using suitable methods.	X	X
5.6	Hardness ²⁾	Shall conform with product standards or design documentation.	Test in accordance with ISO 6508-1 or ISO 6507-1 ³⁾ . Inner ring, outer ring and three rolling elements shall be tested. The test shall be performed on the ground, polished cross-sectional area of the rings adjacent to the raceways. The test shall be performed on a ground, polished flat surface of the rolling elements.	X	X
Footnotes are given at the end of the table.					

Table 1 (continued)

Sub-clause	Characteristics	Requirements	Inspection and test methods	Q ¹⁾	A ¹⁾
5.7	Surface roughness ²⁾	Shall conform with product standards or design documentation.	Test in accordance with ISO 4288.	X	X
5.8	Surface treatment	Shall conform with product standards or design documentation.	— Visual inspection — In accordance with surface treatment standard	X	X
5.9	Lubrication	At least 80 % of the free space in the bearing shall be charged with the grease specified in the product standards or design documentation.	Visual inspection after removal of seals or shields.	X	
			Visual inspection during manufacture		X
5.10	Seals or shields				
5.10.1	Retention	All bearings: Seals or shields shall be fitted correctly and shall not hinder the performance of the bearings. Self-aligning bearings: After the test, the seals or shields shall not have become loose or deformed.	Visual inspection See annex B	X	X
5.10.2	Sealing	Seals shall: — retain grease.	Visual inspection after the rings are manually turned in relation to each other.	X	X
5.10.3	Temperature test	After this test, bearings shall conform with 5.10.1 and 5.13.1.	See annex D	X	
5.11	Running accuracy: — radial: K_{ia} , K_{ea} — axial: S_{ia} , S_{ea}	Shall conform with product standards or design documentation.	See annex E	X	X
5.12	Internal clearances: — radial: G_r — axial: G_a — diagonal: G_d	Shall conform with product standards or design documentation.	See annex C	X	X
Footnotes are given at the end of the table.					