



Designation: F 2094 – 01a

Standard Specification for Silicon Nitride Bearing Balls¹

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1. Scope

1.1 This specification covers the establishment of the basic quality, physical/mechanical property, and test requirements for silicon nitride balls Classes I, II, and III to be used for ball bearings and specialty ball applications.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 Order of Precedence:

2.1.1 In the event of a conflict between the test of this document and the references herein, the text of this document takes precedence. Nothing in this document, however, supercedes applicable laws and regulations unless a specific exemption has been obtained.

2.2 ASTM Standards:

C 373 Test for Water Absorption, Bulk Density²

C 1161 Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature³

C 1198 Test Method for Dynamic Young's Modulus, Shear Modulus, and Poisson's Ratio for Advanced Ceramics by Sonic Resonance³

C 1239 Practice for the Reporting Uniaxial Strength Data and Estimating Weibull Distribution Parameters for Advanced Ceramics³

C 1327 Test Method for Vickers Indentation Hardness of Advanced Ceramics³

C 1421 Test Methods for the Determination of Fracture Toughness of Advanced Ceramic Materials at Ambient Temperatures³

E 165 Test Method for Liquid Penetrant Examination⁴

E 384 Test Method for Microhardness of Materials⁵

E 831 Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis⁶

E 1417 Practice for Liquid Penetrant Examination⁴

2.3 ANSI Standard:

ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes⁷

2.4 ABMA Standards:

STD 1 Terminology for Anti-Friction Ball and Roller Bearings and Parts⁸

STD 10 Metal Balls⁸

2.5 ASME Standard:

B 46.1 Surface Texture (Surface Roughness, Waviness, and Lay)⁹

2.6 DIN Standards:¹⁰

5401 Rolling Bearings; Balls of Through-Hardening Rolling Bearing Steel, Part 1

5401 Rolling Bearings; Balls of Through-Hardening Rolling Bearing Steel, Part 2

2.7 ISO Standards:

3290 Rolling Bearings, Bearing Parts, Balls for Rolling Bearings¹¹

4505 Hardmetals—Metallographic Determination of Porosity and Uncombined Carbon¹¹

2.8 JIS Standards:

R 1601 Testing Method for Flexural Strength (Modulus of Rupture) of High Performance Ceramics¹²

R 1602 Testing Method for Elastic Modulus of High Performance Ceramics¹²

R 1603 Methods for Chemical Analysis of Fine Silicon Nitride Powders for Fine Ceramics¹²

⁵ Annual Book of ASTM Standards, Vol 03.01.

⁶ Annual Book of ASTM Standards, Vol 14.02.

⁷ Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

⁸ Application for copies should be addressed to the American Bearing Manufacturer's Association, 1200 19th Street NW, Suite 300, Washington, DC 20036-2401.

⁹ Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East Street, New York, NY 10017.

¹⁰ Application for copies should be addressed to the Deutsches Institut Für Normung (German Standards Institute), Burggrafenstrasse 6, D 10787 Berlin, Germany.

¹¹ Application for copies should be addressed to the American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002.

¹² Application for copies should be addressed to the Japanese Standards Association, 1-24 Akasaka 4 chome, Minato-ku, Tokyo. 107 Japan.

¹ This specification is under the jurisdiction of ASTM Committee F34 on Rolling Element Bearings and is the direct responsibility of Subcommittee F34.01 on Rolling Elements.

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² Annual Book of ASTM Standards, Vol 15.02.

³ Annual Book of ASTM Standards, Vol 15.01.

⁴ Annual Book of ASTM Standards, Vol 03.03.