



Standard Specification for Silicon Nitride Bearing Balls¹

This standard is issued under the fixed designation F2094/F2094M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Table 4 was editorially corrected in November 2016.

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 may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

2. Referenced Documents

2.1 Order of Precedence:

2.1.1 In the event of a conflict between the text 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:²

C1161 Test Method for Flexural Strength of Advanced Ceramics at Ambient Temperature

C1421 Test Methods for Determination of Fracture Toughness of Advanced Ceramics at Ambient Temperature

2.3 ANSI Standard:

ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes³

2.4 ABMA Standards:

STD 10 Metal Balls⁴

2.5 ASME Standard:

B 46.1 Surface Texture (Surface Roughness, Waviness, and Lay)⁵

2.6 ISO Standards:

4505 Hardmetals—Metallographic Determination of Porosity and Uncombined Carbon³

2.7 JIS Standards:

R 1601 Testing Method for Flexural Strength (Modulus of Rupture) of High Performance Ceramics⁶

R 1607 Testing Method for Fracture Toughness of High Performance Ceramics⁶

2.8 CEN Standards:

EN 843-1 Advanced Technical Ceramics—Monolithic Ceramics—Mechanical Properties at Room Temperature, Part 1. Determination of Flexural Strength⁷

ENV 843-5 Advanced Technical Ceramics—Monolithic Ceramics—Mechanical Properties at Room Temperature, Part 5, Statistical Analysis⁷

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *ball diameter variation, Vdws, n*—ball diameter variation is the difference between the largest and smallest diameter measured on the same ball.

3.1.2 *ball gage, S, n*—prescribed small amount by which the lot mean diameter should differ from nominal diameter, this amount being one of an established series of amounts. A ball gage, in combination with the ball grade and nominal ball diameter, should be considered as the most exact ball size specification to be used by a customer for ordering purposes.

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 Element.

Current edition approved March 15, 2014. Published March 2014. Originally approved in 2001. Last previous edition approved in 2013 as F2094/F2094M–13. DOI: 10.1520/F2094_F2094M-14E01.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Application for copies should be addressed to the American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Application for copies should be addressed to the American Bearing Manufacturer's Association, 1200 19th Street NW, Suite 300, Washington, DC 20036-2401.

⁵ Application for copies should be addressed to the American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁶ Application for copies should be addressed to the Japanese Standards Organization (JSA), 4-1-24 Akasaka Minato-Ku, Tokyo, 107-8440, Japan, <http://www.jsa.or.jp>.

⁷ Application for copies should be addressed to the British Standards Institute (BSI), 389 Chiswick High Rd., London W4 4AL, U.K., <http://www.bsi-global.com>.