



Standard Specification for Silicon Nitride Cylindrical Bearing Rollers¹

This standard is issued under the fixed designation F2730/F2730M; 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.

1. Scope

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

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 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 ASME Standard:³

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

2.4 JIS Standards:⁴

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

R 1607 Testing Method for Fracture Toughness of High Performance Ceramics

2.5 CEN Standards:⁵

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

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

2.6 ISO Standard:⁶

Hardmetals—Metallographic determination of porosity and uncombined carbon

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *ceramic second phase, n*—sintering additive based phases, for example yttria and alumina, which appear darker or lighter than the silicon nitride matrix but are not highly reflective in nature when viewed under reflected light microscopy and bright field illumination.

3.1.2 *chips, n*—break-outs of material greater in extent than 0.25 mm [0.1 in.] typically at the corner chamfers or the junction of the chamfers with the cylindrical surface or end face.

3.1.3 *color variation, n*—an area that appears lighter or darker than the surrounding area under reflected light microscopy but with no discernible physical discontinuity associated with it.

3.1.3.1 *Discussion*—Color variation is often not visible under scanning electron microscopy (SEM) examination.

3.1.4 *cracks, n*—irregular, narrow breaks in the surface of the roller typically having a visible width of less than 0.002 mm. [0.00008 in.]

3.1.4.1 *Discussion*—Most cracks are formed after densification but occasionally may be present as material faults. Some cracks may not be visible with normal white light microscopy and may only show up under ultraviolet light after processing with a suitable fluorescent penetrant.

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 2008. Last previous edition approved in 2013 as F2708/F2708M–13. DOI: 10.1520/F2730_F2730M-14.

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 Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁴ Available from Japanese Standards Organization (JSA), 4-1-24 Akasaka Minato-Ku, Tokyo, 107-8440, Japan, <http://www.jsa.or.jp>.

⁵ Available from European Committee for Standardization (CEN), 36 rue de Stassart, B-1050, Brussels, Belgium, <http://www.cenorm.be>.

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.