Designation: F2443 – 04 (Reapproved 2012)

Standard Specification for Roller, Bearing, Needle, Ferrous, Solid, Spherical End[1]

This standard is issued under the fixed designation F2443; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers ferrous needle rollers having spherical ends.

1.2 Spherical-ended needle rollers designed to this specification are intended for use as bearing components. A complement of rollers is run on a hardened (HRC 58-65, see Test Methods E18) shaft and in a hardened (HRC 58-65) housing bore to form the bearing.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 This specification contains many of the requirements of MS19065, which was originally developed by the Department of Defense and maintained by the Defense Supply Center Richmond. The following government activity codes may be found in the Department of Defense, Standardization Directory SD-1.[2]

Preparing activity	Custodians	Review Activities
DLA–GS4	Army–AT	Navy–MC
	Navy–OS	Air Force–84
	Air Force–99	
	DLA–GS4	

2. Referenced Documents

2.1 *ASTM Standards:*[3]

A295 Specification for High-Carbon Anti-Friction Bearing Steel

E18 Test Methods for Rockwell Hardness of Metallic Materials

2.2 *ABMA Standard:*[4]

ABMA 4 Tolerance Definitions and Gauging Practices for Ball and Roller Bearings

2.3 *ANSI Standard:*[5]

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection of Attributes

2.4 *ASME Standards.*[6]

ASME B46.1 Surface Texture, Surface Roughness Waviness and Lay

ASME Y14.5M Dimensioning and Tolerancing

2.5 *ISO Standard:*[5]

ISO 5593 Rolling Bearings–Vocabulary

2.6 *Military Standard.*[7]

MIL-STD-129 Marking for Shipping and Storage

MIL-STD-130 Identification Marking of U.S. Military Property

MIL-DTL-197 Packaging of Bearing, Associated Parts and Subassemblies

2.7 *SAE Standards:*[8]

SAE J404 Chemical Compositions of SAE Alloy Steels

SAE AMS 66 Steel: Chemical Composition and Hardenability

SAE AMS 6440 Specification for Steel Bars, Forging and Tubing

SAE AMS 6444 Specification for Steel Bars, Forging and Tubing Premium Aircraft Quality for Bearing Application

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to ABMA 4 and ISO 5593.

[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.

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[2] The Military codes that are listed in SD-1 give the address and phone numbers of the DoD contacts. These are found in the DoD's ASSIST website: http://assist.daps.dla.mil/online/start/.

[3] 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.

[4] Available from Techstreet, 3916 Ranchero Dr. Ann Arbor, MI, 48108, http://www.techstreet.com.

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

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

[7] Available on the DOD's ASSIST internet site located at: http://assist.daps.dla.mil/online/start/.

[8] Available from SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, http://aerospace.sae.org.

4. Ordering Information

4.1 When ordering parts in accordance with this specification, specify the following:

4.1.1 ASTM designation number, including year of issue,

4.1.2 Dash number (see Table 1),

4.1.3 Dimensions of roller, including:

4.1.3.1 Diameter, in. (mm),

4.1.3.2 Length, in. (mm),

4.1.3.3 Effective length, in. (mm),

4.1.4 Level of packaging and preservation (for military procurements), and

4.1.5 Required certifications.

TABLE 1 Needle Roller with Spherical Ends Dimensions

MS Part No.	D_w Roller Diameter	L_w Roller Length	L_{we} Effective Length
	+0.0000 −0.0002 in.	+0.000 −0.020 in.	in.
MS 19065-1	0.0312	0.190	0.182
MS 19065-2	0.0312	0.250	0.242
MS 19065-3	0.0312	0.310	0.302
MS 19065-4	0.0469	0.250	0.238
MS 19065-5	0.0469	0.310	0.298
MS 19065-6	0.0469	0.380	0.368
MS 19065-7	0.0469	0.440	0.428
MS 19065-8	0.0625	0.380	0.354
MS 19065-9	0.0625	0.440	0.424
MS 19065-10	0.0625	0.500	0.484
MS 19065-11	0.0625	0.560	0.544
MS 19065-12	0.0625	0.620	0.604
MS 19065-13	0.0781	0.440	0.421
MS 19065-14	0.0781	0.500	0.481
MS 19065-15	0.0781	0.560	0.541
MS 19065-16	0.0781	0.620	0.601
MS 19065-17	0.0781	0.690	0.671
MS 19065-18	0.0781	0.750	0.731
MS 19065-19	0.0938	0.560	0.537
MS 19065-20	0.0938	0.620	0.597
MS 19065-21	0.0938	0.690	0.667
MS 19065-22	0.0938	0.750	0.727
MS 19065-23	0.0938	0.810	0.787
MS 19065-24	0.0938	0.880	0.857
MS 19065-25	0.1094	0.620	0.593
MS 19065-26	0.1094	0.750	0.723
MS 19065-27	0.1094	0.880	0.853
MS 19065-28	0.1094	1.000	0.973
MS 19065-29	0.1250	0.750	0.719
MS 19065-30	0.1250	0.880	0.849
MS 19065-31	0.1250	1.000	0.969
MS 19065-32	0.1250	1.120	1.089
MS 19065-33	0.1250	1.250	1.219
MS 19065-34	0.1562	1.000	0.961
MS 19065-35	0.1562	1.250	1.211
MS 19065-36	0.1562	1.500	1.461
MS 19065-37	0.1875	1.000	0.953
MS 19065-38	0.1875	1.250	1.203
MS 19065-39	0.1875	1.500	1.453
MS 19065-40	0.2188	1.000	0.945
MS 19065-41	0.2188	1.250	1.195
MS 19065-42	0.2188	1.500	1.445
MS 19065-43	0.2500	0.500	0.437
MS 19065-44	0.2500	0.750	0.687
MS 19065-45	0.2500	1.000	0.937
MS 19065-46	0.2500	1.250	1.187
MS 19065-47	0.2500	1.500	1.437
MS 19065-48	0.2500	1.750	1.687

5. Materials and Manufacture

5.1 *Rollers*—Rollers shall be manufactured of chrome alloy steel E50100, E51100, E52100, in accordance with SAE AMS 66, SAE AMS 6440, SAE AMS 6444, and Specification A295.

5.2 The use of recycled materials that meet the requirements of the applicable material specification without jeopardizing the intended use of the item is encouraged.

5.3 Material certifications are required for all materials used. Each lot of needle rollers shall be traceable to these certifications. These certifications shall be available for review by the purchaser and provided to the purchaser when specified in the contract or purchase order. The needle roller manufacturer shall determine conformance of materials on a periodic basis. These tests may be performed by the manufacturer's internal laboratory or by a laboratory external to the manufacturer. X-ray energy spectrometry, or comparable technology, may be used for the chemical identification and analysis of the materials.

6. Other Requirements

6.1 *Heat Treatment:*

6.1.1 *Rollers 0.125 in. (3.18 mm) and Smaller Diameter,* shall be through hardened to Rockwell HRA 81.2-83.4, in accordance with Test Methods E18.

6.1.2 *Rollers Larger than 0.125 in (3.18 mm) Diameter,* shall be through hardened to Rockwell HRC 60 to 64 in accordance with Test Methods E18.

NOTE 1—Hardness tests can be made using various techniques; however, in the case of disputes, a hardness test made on flats of sufficient width to give a true reading will be considered to be the definitive value.

6.2 *Protective Coating:*

6.2.1 Manufacturer shall put rollers in rust-preventative packaging or coat rollers with rust-preventive film.

6.2.2 A material certification for the rust preventative shall be available for review by the purchaser. The needle roller manufacturer shall determine conformance of the rust preventative material(s) on a periodic basis. If the purchaser maintains a list of approved rust preventatives, and if the rust preventative supplied by the needle roller manufacturer is on the approved list, then the requirement for periodic testing of the rust preventative would be eliminated. For example, periodic testing would not be required if parts supplied to the Department of Defense were protected with a rust preventative listed in a current QPL (Qualified Products List).

7. Dimensions and Permissible Variations

7.1 Dimensioning and tolerancing shall conform to ASME Y14.5M.

7.2 Products manufactured in accordance with this specification shall meet the requirements shown in Table 1.

7.2.1 *Roller Diameter,* D_w—Perfect form at MMC (maximum material condition) is not required.

7.2.2 The reference end form radius, R_w, is approximately equal to the roller diameter, D_w.

7.2.3 The effective length, L_{we}, is only to be used for calculating capacities.