Designation: F2431 – 04 (Reapproved 2012)

Standard Specification for Ring Bearing, Inner: For Needle Roller Bearing with Thick Outer Ring[1]

This standard is issued under the fixed designation F2431; 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 inner rings for needle roller bearings having thick outer rings.

1.2 The inner rings being specified are intended for use on unhardened shafts in conjunction with the MS51961 needle roller bearings specified in Specification F2246.

1.2.1 For needle roller bearings with thin outer rings (Specification F2162, MS17131, MS52141) use inner rings specified in Specification F2163.

1.3 Inner rings designed to this specification are intended for use in applications requiring high radial load with minimal angular shaft misalignment.

1.4 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.

1.5 This specification contains many of the requirements of MS51962, which was originally developed by the Department of Defense and maintained by the Defense Supply Center in Richmond. The following government activity codes may be found in the Department of Defense, Standardization Directory SD-1.[2]

Preparing activity	Custodians	Review Activity
DLA–GS4	Army –AT Navy–OS Air Force–-99	Air Force–84

2. Referenced Documents

2.1 *ASTM Standards:*[3]

E18 Test Methods for Rockwell Hardness of Metallic Materials

F2162 Specification for Bearing, Roller, Needle: Drawn Outer Ring, Full Complement, Without Inner Ring, Open and Closed End, Standard Type

F2163 Specification for Ring, Bearing, Inner: for Needle Roller Bearing With Drawn Outer Ring

F2246 Specification for Bearing, Roller, Needle: Thick Outer Ring With Rollers and Cage

2.2 *ANSI Standard:*[4]

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

2.3 *SAE Standards:*[5]

SAE J404 Chemical Compositions of SAE Alloy Steels

SAE AMSSTD66 Steel: Chemical Composition and Hardenability

2.4 *Military Standard.*[6]

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

MIL-STD-197 Packaging of Bearings, Associated Parts and Subassemblies

2.5 *ABMA Standards:*[7]

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

ABMA 18.2 Needle Roller Bearings Radial, Inch Design

2.6 *ISO Standard:*[4]

ISO 5593 Rolling Bearings—Vocabulary

[1] This specification is under the jurisdiction of ASTM Committee F34 on Rolling Element Bearings and is the direct responsibility of Subcommittee Automotive/Industrial Bearing.

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

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

[6] Available on the DOD's ASSIST website, http://assist.daps.dla.mil/online/start/.

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

3. Terminology

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

4. Ordering Information

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

TABLE 1 Inner Ring Dimensions

Dash Number	*d* Bore Diameter, in.			*F* Outside Diameter, in.			*B* Width, in. +0.000, -0.005	*r* Radius, in. (see 7.3)	Mating Bearing MS51961 Dash Number (see Specification F2246)
	Nom.	Min.	Max.	Nom.	Min.	Max.			
-1	3/8	0.3746	0.3750	5/8	0.6241	0.6245	0.760	0.025	-1
-2	1/2	0.4996	0.5000	3/4	0.7488	0.7493	0.760	0.040	-2
-3	1/2	0.4996	0.5000	3/4	0.7488	0.7493	1.010	0.040	-3
-4	5/8	0.6246	0.6250	7/8	0.8738	0.8743	0.760	0.040	-5
-5	3/4	0.7496	0.7500	1	0.9988	0.9993	0.760	0.040	-8
-6	13/16	0.8120	0.8125	1	0.9988	0.9993	0.760	0.040	-8
-7	13/16	0.8120	0.8125	1	0.9988	0.9993	1.010	0.040	-9
-8	7/8	0.8745	0.8750	1 1/8	1.1236	1.1241	1.010	0.040	-11
-9	15/16	0.9370	0.9375	1 1/8	1.1236	1.1241	1.010	0.040	-11
-10	1	0.9995	1.0000	1 1/4	1.2485	1.2491	1.010	0.040	-14
-11	1	0.9995	1.0000	1 1/4	1.2485	1.2491	1.260	0.040	-15
-12	1 1/8	1.1245	1.1250	1 3/8	1.3735	1.3741	1.010	0.040	-18
-13	1 1/8	1.1245	1.1250	1 3/8	1.3735	1.3741	1.260	0.040	-19
-14	1 3/16	1.1870	1.1875	1 1/2	1.4984	1.4990	1.260	0.060	-22
-15	1 1/4	1.2495	1.2500	1 1/2	1.4984	1.4990	1.010	0.060	-21
-16	1 1/4	1.2495	1.2500	1 1/2	1.4984	1.4990	1.260	0.060	-22
-17	1 5/16	1.3210	1.3125	1 5/8	1.6234	1.6240	1.010	0.060	-24
-18	1 3/8	1.3745	1.3750	1 5/8	1.6234	1.6240	1.260	0.060	-25
-19	1 3/8	1.3745	1.3750	1 3/4	1.7484	1.7490	1.260	0.060	-28
-20	1 7/16	1.4370	1.4375	1 3/4	1.7484	1.7490	1.260	0.060	-28
-21	1 1/2	1.4995	1.5000	1 3/4	1.7484	1.7490	1.010	0.060	-27
-22	1 1/2	1.4995	1.5000	1 3/4	1.7484	1.7490	1.260	0.060	-28
-23	1 5/8	1.6245	1.6250	2	1.9982	1.9989	1.260	0.060	-30
-24	1 3/4	1.7495	1.7500	2 1/4	2.2482	2.2489	1.510	0.060	-31
-25	1 3/4	1.7495	1.7500	2 1/4	2.2482	2.2489	1.510	0.060	-32
-26	1 15/16	1.9370	1.9375	2 1/2	2.4982	2.4989	1.760	0.080	-34
-27	2	1.9995	2.0000	2 1/2	2.4982	2.4989	1.510	0.080	-33
-28	2 3/16	2.1869	2.1875	2 3/4	2.7482	2.7489	1.760	0.080	-36
-29	2 1/4	2.2494	2.2500	2 3/4	2.7482	2.7489	1.510	0.080	-35
-30	2 3/8	2.3744	2.3750	3	2.9982	2.9989	1.760	0.080	-38
-31	2 1/2	2.4994	2.5000	3	2.9982	2.9989	1.510	0.080	-37
-32	2 3/4	2.7494	2.7500	3 1/4	3.2478	3.2487	1.760	0.080	-39
-33	2 3/4	2.7494	2.7500	3 1/4	3.2478	3.2487	2.010	0.080	-40
-34	2 15/16	2.9369	2.9375	3 1/2	3.4978	3.4987	2.010	0.080	-42
-35	3 1/8	3.1244	3.1250	3 3/4	3.7478	3.7487	2.010	0.100	-43
-36	3 1/4	3.2494	3.2500	3 3/4	3.7478	3.7487	2.010	0.100	-43
-37	3 1/4	3.2494	3.2500	4	3.9976	3.9985	2.010	0.100	-45
-38	3 3/8	3.3742	3.3750	4	3.9976	3.9985	2.010	0.100	-45
-39	3 1/2	3.4992	3.5000	4 1/4	4.2476	4.2485	2.010	0.100	-46
-40	3 3/4	3.7492	3.7500	4 1/4	4.2476	4.2485	2.010	0.100	-46
-41	3 3/4	3.7492	3.7500	4 1/2	4.4976	4.4985	2.510	0.100	-49
-42	4	3.9992	4.0000	5	4.9975	4.9985	2.510	0.100	-51
-43	4 1/2	4.4992	4.5000	5 1/2	5.4975	5.4985	2.515	0.100	-52
-44	4 1/2	4.4992	4.5000	5 1/2	5.4975	5.4985	3.015	0.100	-53
-45	4 3/4	4.7492	4.7500	5 3/4	5.7473	5.7483	3.015	0.120	-54
-46	5	4.9990	5.0000	6	5.9973	5.9983	2.515	0.120	-55
-47	5	4.9990	5.0000	6	5.9973	5.9983	3.015	0.120	-56
-48	5 1/2	5.4990	5.5000	6 1/2	6.4973	6.4983	2.515	0.120	-57
-49	5 1/2	5.4990	5.5000	6 1/2	6.4973	6.4983	3.015	01.20	-58
-50	6	5.9990	6.0000	7 1/4	7.2469	7.2481	3.015	0.120	-59

4.1.1 ASTM designation number, including year of issue,
4.1.2 Dash number (see Table 1),
4.1.3 Dimensions of inner ring, including:
4.1.3.1 Bore diameter, in. (mm),
4.1.3.2 Outside diameter, in. (mm),
4.1.3.3 Width, in. (mm), and
4.1.3.4 Radius, in. (mm),
4.1.4 Level of packaging and preservation (for Military procurements).

5. Materials and Manufacture

5.1 *Inner Ring*—Rings shall be manufactured of steel, alloy or carbon, carburizing grade 4620, 4720, 8620, 8720, or 1018 to 1022 or 1117; or SAE E51100, SAE E52100, in accordance with SAE AMS STD 66 or SAE 51100 or SAE J404.

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.

6. Other Requirements

6.1 *Heat Treatment:*
6.1.1 *Rings:*
6.1.1.1 Steel 4620, 4720, 8620, 8720, and 1018 to 1022 or 1117 shall be case hardened to Rockwell HRC 58–65, in accordance with Test Methods E18. Case depth shall be 0.025 in. (0.64 mm) minimum.
6.1.1.2 Steel SAE E51100 and SAE 52100 shall be through hardened to Rockwell HRC 58-65, in accordance with Test Methods E18.

6.2 *Protective Coating:*
6.2.1 Unless otherwise specified, inner rings shall be furnished without plating.
6.2.2 Manufacturer shall coat bearings with rust preventive film.

7. Dimensions and Permissible Variations

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

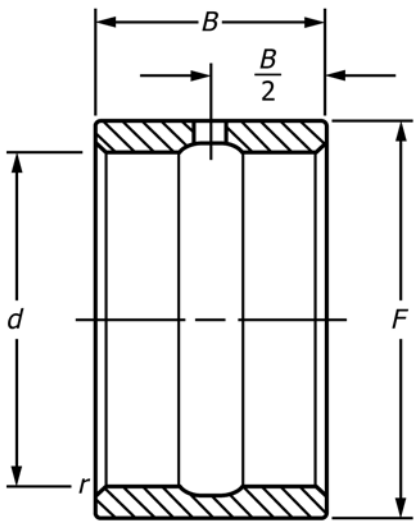

FIG. 1 Schematic Drawing—Inner Ring

7.1.1 Given the shaft diameter and radial load for a particular bearing application, the bore diameter of the inner ring is selected from the shaft size. The outside diameters and width are chosen by dimensionally mating the inner ring with the bearing from Specification F2246 that exhibits the required load capacity.

7.2 Rings are intended to be installed on shafts where maximum taper does not exceed 0.0005 in./in. (0.0005 mm/mm) of bearing width.

7.3 Ring must clear the maximum shaft fillet radius shown in the radius column of Table 1. The radii or chamfers on the inner diameter of the ring may be unequal. Where the radii are unequal, the surface with the larger relief should be mounted against the shaft shoulder. In rings where the inside diameter relief radii are not equal, the marking shall appear on the surface with the lesser radius.

7.4 Rings shall contain between one and four oil holes, size and number shall be in accordance with manufacturer's standard practice.

7.5 Oil groove optional in accordance with manufacturer's standard practice

8. Workmanship, Finish, and Appearance

8.1 *Surface Finish:*
8.1.1 *Rings*—The raceway surface (O.D.) of the inner ring shall have a maximum surface roughness, in accordance with ANSI B46.1, of 20 µin. *Ra* (0.51 µm *Ra*).

9. Inspection

9.1 Inspection of the product shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

10. Rejection and Rehearing

10.1 Products that fail to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for rehearing.

11. Certification

11.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

12. Product Marking

12.1 Marking shall consist of the part number and the manufacturer's identification in accordance with MIL-STD-130.
12.1.1 The part number shall consist of the MS51962 designation plus the dash number (see Table 1). For example, MS51962-1

12.2 In rings where the inside diameter relief radii are not equal, the marking shall appear on the surface with the lesser radius.

13. Packaging

13.1 Unless otherwise specified in the contract or purchase order, military procurements shall be packaged and preserved in accordance with MIL-DTL-197. Level of packaging and preservation method shall be as specified in the contract or purchase order.

14. Keywords

14.1 inner ring; MS51961; MS51962; needle roller; radial bearing