



Designation: F 2162 – 01

Standard Specification for Bearing, Roller, Needle: Drawn Outer Ring, Full Complement, Without Inner Ring, Open and Closed End, Standard Type¹

This standard is issued under the fixed designation F 2162; 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 standard-type needle roller bearings having drawn outer rings, full complement, without inner rings, with either open or closed ends.

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

1.3 The inner rings specified in this specification are not intended for use in flight critical systems of aircraft.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information only.

NOTE 1—This specification was originally developed by the Department of Defense and maintained by the Defense Supply Center Richmond. It is intended to replicate the requirements of MS 17130.

2. Referenced Documents

2.1 ASTM Standards:

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials²

E 140 Standard Hardness Conversion Tables for Metals (Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Rockwell Superficial Hardness, Knoop Hardness, and Scleroscope Hardness)²

E 384 Test Method for Microindentation Hardness²

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2.2 ASME Standard:

ASME B 46.1 Surface Texture Surface Roughness, Waviness, and Lay³

2.3 SAE Standard:

SAE J-404 Chemical Composition of SAE Alloy Steels⁴

2.4 Military Standard:

MIL-STD-130 Identification Marking of US Military Property⁵

2.5 American Bearing Manufacturer's Association (ABMA) Standard:

STD 4 Tolerance Definitions and Gauging Practices For Ball and Roller Bearings⁶

2.6 ISO Standards:

ISO 5593 Rolling Bearings—Vocabulary⁷

ISO 1132 Rolling Bearings—Tolerances—Definitions⁷

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to ABMA STD 4 Tolerance Definitions and Gauging Practices for Ball and Roller Bearings, ISO 1132 Rolling Bearings—Tolerances—Definitions, and to ISO 5593 Rolling Bearings—Vocabulary

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *average life (L_{50})*, n —for a radial roller bearing, the number of revolutions that 50 % of a group of bearings will complete or exceed before the first evidence of fatigue develops.

3.2.1.1 *Discussion*—The average life maybe as much as five times the rating life.

3.2.2 *basic dynamic load rating (C_r)*, n —for a radial roller bearing, that calculated, constant radial load that a group of apparently identical bearings with stationary outer rings can theoretically endure for a rating life of one million revolutions of the inner ring.

3.2.2.1 *Discussion*—Since applied loading as great as the basic dynamic load rating tends to cause local plastic deformation of the rolling surfaces, it is not anticipated that such heavy loading would normally be applied.

3.2.3 *basic static load rating (C_{or})*, n —for a radial roller bearing, that uniformly distributed static radial load which produces a maximum contact stress of 580 000 psi (4000 Mpa) at the center of the contact of the most heavily loaded rolling element.

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 *Annual Book of ASTM Standards*, Vol 03.01.

³ Available from Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112.

⁴ Available from SAI International, 400 Commonwealth Dr., Warrendale, PA 15096-0001.

⁵ Available from USA Information Systems, 1092 Laskin Rd., Ste. 208, Virginia Beach, VA 23451.

⁶ Available from the American Bearing Manufacturer's Association, 1200 19th St. NW, Ste. 300, Washington, DC 20036-2401.

⁷ Available from ANSI, 1819 L St. NW, Ste. 600, Washington, DC 20036.

3.2.3.1 *Discussion*—For this contact stress, total permanent deformation of rolling element and raceway occurs which is approximately 0.0001 or the roller diameter.

3.2.4 *rating life* (L_{10}), n —for a radial roller bearing, the number of revolutions that 90 % of a group of bearings will complete or exceed before the first evidence of fatigue develops.

4. Classification

4.1 This specification covers the following types of roller bearings:

- 4.1.1 *Type B*—Open end roller bearings, and
- 4.1.2 *Type M*—Closed end roller bearings.

5. Ordering Information

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

- 5.1.1 ASTM designation number, including year of issue,
- 5.1.2 Type, whether Type B or Type M roller bearings (see Section 4) are to be furnished,
- 5.1.3 Dash number (see Table 1),
- 5.1.4 Dimensions of roller bearings, including:
 - 5.1.4.1 Bore diameter, in;
 - 5.1.4.2 Ring gage diameter, in;
 - 5.1.4.3 Width, in; and
 - 5.1.4.4 Shaft diameter, in;
- 5.1.5 Load rating, including basic static load rating, lb and basic dynamic load rating, lb;
- 5.1.6 Approximate limiting speed, rpm; and
- 5.1.7 Maximum end thickness.

6. Materials and Manufacture

6.1 *Needle Rollers*—Needle rollers shall be manufactured of steel, alloy or carbon, of grades E50100 or E52100 in accordance with SAE AHS STD-66, or 1090 or 1095 in accordance with SAE J-404.

6.2 *Rings*—Rings shall be manufactured of steel, alloy, or carbon, carburizing grade 4620, 4720, 8620, 8720, or 1010-1020 in accordance with SAE AHS STD-66.

7. Other Requirements

7.1 *Heat Treatment:*

7.1.1 *Needle Rollers*—Needle rollers shall be through-hardened to Rockwell HRC58 or equivalent, in accordance with Test Methods E 18.

7.1.2 *Rings*—Rings shall be case hardened to surface hardness of Rockwell HRC58-65 or equivalent, in accordance with Test Methods E 18 with a 0.003 in. minimum case depth.

7.1.2.1 This case depth will not support Rockwell HR15N. Use of a standard file test in accordance with SAE J-864 or microsection and microhardness test in accordance with Test Method E 18 is required to determine the surface hardness.

7.1.3 *Shafts*—Bearings are intended to be used with shafts hardened to Rockwell HRC58-65 in accordance with Test Methods E 18.

7.1.3.1 When an open end bearing is used with an unhardened shaft, the bearing shall be used in conjunction with an inner bearing ring (F 2163).

7.2 *Protective Coating:*

7.2.1 Needle rollers and rings shall be furnished without plating.

7.2.2 Manufacturer shall coat bearings with rust preventive film.

7.3 *Lubrication*—Bearings shall be furnished without lubrication.

7.4 Rollers shall be retained by the outer ring.

7.5 Bearings shall not be furnished with roller separators.

7.6 Oil holes shall be furnished in accordance with the manufacturer’s standard practice.

8. Dimensions, Mass, and Permissible Variations

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

8.2 *Plug Gages*—The “go” plug gage is the same size as the minimum diameter under the needle rollers column in Table 1, and the “no go” plug gage size is 0.0001 in. larger than the maximum diameter under the needle rollers column in Table 1. Inspection of the bearing bore shall be made with the bearing pressed into a ring gage of the size shown in the ring gage diameter column of Table 1.

8.3 Bearings are intended to be installed on shafts where maximum deflection does not exceed 0.0010 in. per inch of bearing width.

8.4 Applications involving oscillating motion often require reduced radial clearances. This reduction is accomplished by increasing the shaft raceway diameters, in inches, as follows:

| | |
|---------------------------------------|--|
| Increase in Shaft Raceway Diameter | For Bearings with Bore Diameters of |
| 0.0003 | $\frac{3}{32}$ – $\frac{3}{16}$ |
| 0.0005 | $\frac{1}{4}$ – $\frac{1}{8}$ |
| 0.0006 | 2– $5\frac{1}{2}$ |

8.5 Steel housing bore diameter dimensions, in inches, are as follows:

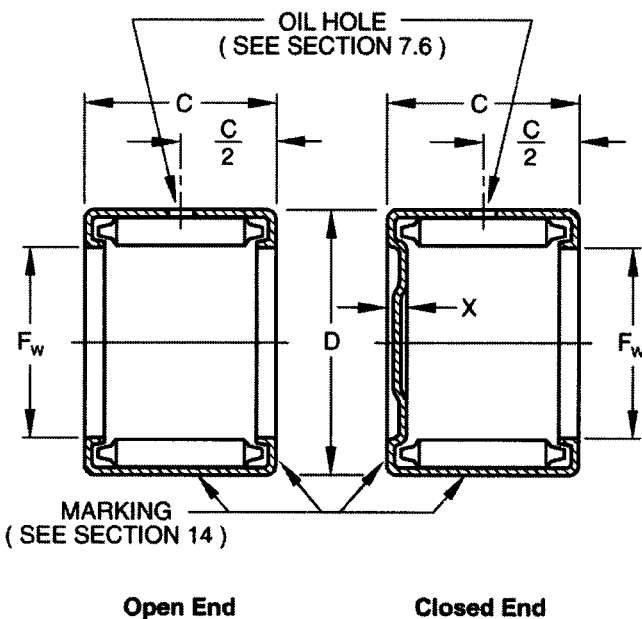


FIG. 1 Schematic Drawing of Type B and Type M Roller Bearings