



Designation: F2591 – 06 (Reapproved 2022)

# Standard Specification for Bearing, Roller, Tapered, Single Row of Rollers (Metric Series)<sup>1</sup>

This standard is issued under the fixed designation F2591; 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 ( $\epsilon$ ) 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 requirements for metric series, tapered roller bearings with a single row of rollers.

1.2 *Intended Use*—The bearings covered in this specification are intended to be used in general industrial and vehicle applications where the operating temperature does not exceed 120 °C (250 °F).

1.3 This specification contains many of the requirements of DS3225, 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.<sup>2</sup>

Preparing Activity DLA-GS4	Custodians Army-AT Navy-MC Air Force-99	Review Activities Army-AV Navy –MC, SH Air Force-84 Other-NS
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1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F34 on Rolling Element Bearings and is the direct responsibility of Subcommittee F34.04 on Automotive/Industrial Bearing.

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<sup>2</sup> 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/>.

## 2. Referenced Documents

2.1 *ABMA Standard*:<sup>3</sup>

ABMA 19.1 Tapered Roller Bearings—Radial, Metric Design

2.2 *ISO Standard*:<sup>4</sup>

ISO 5593 Rolling Bearings—Vocabulary

2.3 *Military Standard*:<sup>5</sup>

MIL-C-11796 Corrosion Preventative Compound, Petrolatum, Hot Application

2.4 *SAE Standard*:<sup>6</sup>

SAE AMS-STD-66 Steel: Chemical Composition and Hard- enability

## 3. Terminology

3.1 *Definitions*:

3.1.1 For definitions of terms used in this specification refer to ISO 5593.

3.1.2 *effective load center*—dimension (a) locates a point on the inner ring (cone) axis that is the center of pressure of all resisting forces set up by the bearing rollers. All moments should be calculated from this point when determining bearing loading and shaft stresses. A minus value of (a) indicates that the center is inside the inner ring (cone) backface.

3.1.3 *K factor*—the K Factor is the ratio of the basic radial dynamic load rating to the basic static load rating.

3.1.4 *contact angle*—these bearing have a contact angle ( $\alpha$ ) between 10 and 19 degrees. The contact angle is the angle between the line of action of the roller load and a plane perpendicular to the bearing axis.

## 4. Ordering Information

4.1 Procurement documents should specify the following:

4.1.1 Title, number, and date of this specification,

<sup>3</sup> Available from Techstreet, 777 E. Eisenhower Parkway, Ann Arbor, MI 48108.

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

<sup>5</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

<sup>6</sup> Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001.

- 4.1.2 Part Number (see 8.1),
- 4.1.3 Nominal dimensions of bearing (bore, outside diameter, bearing width),
- 4.1.4 Quantity required,
- 4.1.5 Inspection records required, and
- 4.1.6 Required packaging.

**5. Materials and Manufacture**

- 5.1 *Material:*
  - 5.1.1 *Outer Ring (Cup), Inner Ring (Cone) and Rollers*—Bearing quality, carburizing grade alloy or through-hardening grade alloy steel in accordance with SAE AMS-STD-66.
  - 5.1.2 *Cage*—Carbon steel (stamped) or powdered process steel (for example, Sinta Forge) may be used.

**6. Physical Properties**

- 6.1 *Hardness*—Outer ring (cup), inner ring (cone) and rollers shall be hardened to 58 HRC to 64 HRC.

**7. Dimensions, Mass, and Permissible Variations**

- 7.1 *Dimensions:*
  - 7.1.1 Dimensions  $D_b$ ,  $D_a$ ,  $d_b$ ,  $d_a$  are recommended shaft and housing shoulder diameters.
  - 7.1.2 Dimensions  $R$  and  $r$  are the maximum fillet radii on the shaft and the housing respectively, which will be cleared by the bearing corner. See Fig. 1 and Table 1.
- 7.2 *Tolerances*—Precision grade (Class B) shall be specified only when technically justified.
  - 7.2.1 *Standard Grade (Class K)*—See Tables 2-5.
  - 7.2.2 *Precision Grade (Class B)*—See Tables 6-9.
- 7.3 *Cage Clearance*—Designers should provide a clearance of 3.2 mm minimum between the outside edge of the cage and the housing counterbore.

**8. Part Number**

8.1 *Part Number*—The Part number shall consist of DS3225, followed by the dash number, followed by -K for a standard grade bearing or -B for a precision grade bearing.

- 8.1.1 *Examples:*
  - 8.1.1.1 DS3225-15-K is a standard grade, 75 mm bore, 145 mm OD, 51 mm wide single row tapered roller bearing.
  - 8.1.1.2 DS3225-15-B is a precision grade, 75 mm bore, 145 mm OD, 51 mm wide single row tapered roller bearing.
- 8.1.2 The ABMA (American Bearing Manufacturers Association) outer and inner numbers are for reference only and are not to be used for ordering purposes.

**9. Lubrication**

9.1 *Lubrication*—Unless specified otherwise, bearings shall be furnished without lubrication.

**10. Preservation, Packaging and Packing**

- 10.1 Packaging and packing shall be as specified in the acquisition document.
- 10.2 *Preservation:*
  - 10.2.1 *Commercial Use*—Manufacturer shall coat bearing with rust preventative film.
  - 10.2.2 *DoD Use*—Unless specified otherwise, bearings shall be furnished with preservative in accordance with MIL-C-11796, Class 3.

**11. Keywords**

11.1 bearing; DS3225; single row bearing; tapered roller bearing

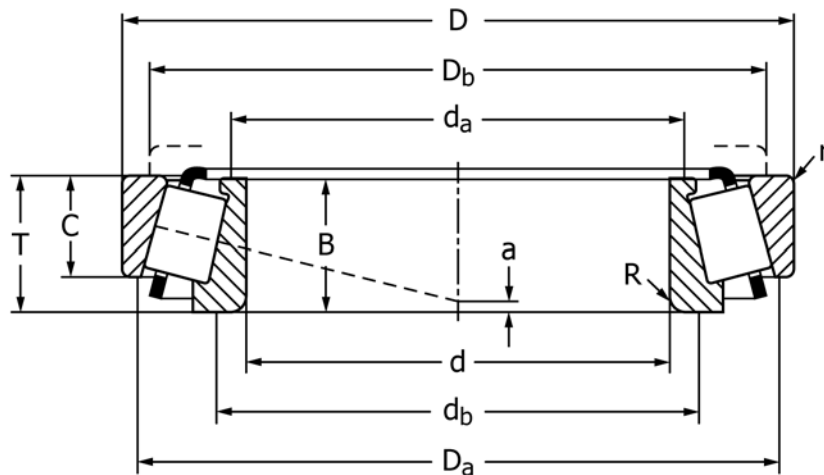


FIG. 1 Schematic Drawing, Metric Series, Single Row, Tapered Roller Bearing

**TABLE 1 Metric Series, Single Row, Tapered Roller Bearing Dimensions**

Dash No.	ABMA Bearing Number (see 8.1) Outer (Cup) Inner (Cone)	d	D	T	B	C	R	r	d <sub>b</sub>	d <sub>a</sub>	D <sub>b</sub>	D <sub>a</sub>	K Factor	Basic Dynamic Load Rating (kN)		a
		Bore	O.D.	Brg. Width	Inner (Cone) Width	Outer (Cup) Width	Max. Shaft Fillet Rad.	Max. Hsg. Fillet Rad.	Recommended Shoulder Diameter		Radial	Thrust		Eff. Load Center		
								Shaft	Housing							
1	JLM104948-JLM104910	50	82	21.5	21.5	17.0	3.0	0.5	60	55.0	76	78.0	1.91	15.0	7.85	-5.4
2	JM205149-JM205110	50	90	28.0	28.0	23.0	3.0	2.5	63	57.0	80	85.0	1.78	22.2	12.45	-7.6
3	JHM807045-JHM807012	50	105	37.0	36.0	29.0	3.0	2.5	69	63.0	90	100.0	1.20	31.8	26.6	-7.5
4	JLM506849-JLM506810	55	90	23.0	23.0	18.5	1.5	0.5	63	61.0	82	86.0	1.45	16.85	11.65	-2.8
5	JM207049-JM207010	55	95	29.0	29.0	23.5	1.5	2.5	64	62.0	85	91.0	1.74	24.0	13.8	-7.6
6	JH307749-JH307710	55	110	39.0	39.0	32.0	3.0	2.5	71	64.1	97	104.0	1.69	37.8	22.4	-11.7
7	JLM508748-JLM508710	60	95	24.0	24.0	19.0	5.0	2.5	75	66.0	85	91.0	1.45	18.2	12.6	-2.7
8	JLM710949-JLM710910	65	105	24.0	23.0	18.5	3.0	1.0	78	72.0	96	100.5	1.29	19.8	15.35	-0.3
9	JM511946-JM511910	65	110	28.0	28.0	22.5	3.0	2.5	78	72.0	99	105.0	1.45	26.2	18.0	-3.4
10	JH211749-JH211710	65	120	39.0	38.5	32.0	3.0	2.5	80	74.0	107	114.0	1.73	41.0	23.6	-10.8
11	JLM813049-JLM813010	70	110	26.0	25.0	20.5	1.0	2.5	78	77.0	98	105.0	1.20	22.0	18.2	+0.4
12	JM612949-JM612910	70	115	29.0	29.0	23.0	3.0	2.5	83	77.0	103	110.0	1.36	27.4	20.2	-2.5
13	JLM714149-JLM714110	75	115	25.0	25.0	19.0	3.0	2.5	87	81.0	104	110.0	1.27	22.0	17.3	+0.4
14	JM714249-JM714210	75	120	31.0	29.5	25.0	3.0	2.5	88	82.9	108	115.0	1.31	30.2	23.0	-2.0
15	JH415647-JH415610	75	145	51.0	51.0	42.0	3.0	2.5	94	89.0	129	139.0	1.61	65.5	40.6	-14.4
16	JM515649-JM515610	80	130	35.0	34.0	28.5	3.0	2.5	94	88.0	117	125.0	1.50	38.0	25.4	-5.2
17	JM716649-JM716610	85	130	30.0	29.0	24.0	3.0	2.5	98	92.0	117	125.0	1.31	31.6	24.0	-0.2
18	JHM516849-JHM516810	85	140	39.0	38.0	31.5	3.0	2.5	100	94.0	125	134.0	1.43	45.5	32.0	-5.9
19	JH217249-JH217210	85	150	46.0	46.0	38.0	3.0	2.5	101	95.0	134	142.0	1.76	62.0	35.2	-11.9
20	JM718149-JM718110	90	145	35.0	34.0	27.0	3.0	2.5	106	99.0	131	138.8	1.31	42.0	32.0	-2.0
21	JHM318448-JHM318410	90	155	44.0	44.0	35.5	3.0	2.5	106	100.0	140	148.0	1.71	61.0	35.8	-10.0
22	JM719149-JM719113	95	150	35.0	34.0	27.0	3.0	2.5	109	104.0	135	143.0	1.32	41.6	31.6	-1.6
23	JM720249-JM720210	100	155	36.0	35.0	28.0	3.0	2.5	115	109.0	140	149.0	1.24	44.8	36.2	+0.3
24	JHM720249-JHM720210	100	160	41.0	40.0	32.0	3.0	2.5	117	109.4	143	153.9	1.24	54.5	43.8	-2.5
25	JM822049-JM822010	110	165	35.0	35.0	26.5	3.0	2.5	125	119.0	149	159.0	1.18	45.0	38.2	+3.0
26	JHM522649-JHM522610	110	180	47.0	46.0	38.0	3.0	2.5	127	122.0	162	172.0	1.44	72.0	50.0	-6.0
27	JHM534149-JHM534110	170	230	39.0	38.0	31.0	3.0	2.5	184	178.0	217	224.0	1.52	69.0	45.5	+4.6
28	JM344449-JM734410	170	240	46.0	44.5	37.0	3.0	2.5	185	180.0	222	232.0	1.34	88.5	66.0	+5.0
29	JM736149-JM736110	180	250	47.0	45.0	37.0	3.0	2.5	196	190.5	232	242.6	1.22	91.5	75.0	+9.0
30	JM738249-JM738210	190	260	46.0	44.0	36.5	3.0	2.5	206	200.0	242	252.0	1.22	85.5	70.0	+10.8
31	JHM840449-JHM840410	200	300	65.0	62.0	51.0	3.5	2.5	223	214.8	273	288.9	1.12	147.5	132.0	+8.1

**TABLE 2 Inner Ring (Cone) Bore Tolerance (Class K)**

Inner Ring Bore (d)			
Size Range, mm	Incl.	Plus	Minus
Over			
30	50	0	-12
50	80	0	-15
80	120	0	-20
120	180	0	-25
180	250	0	-30

**TABLE 4 Bearing Overall Width Tolerance (Class K)**

Bearing Width (T)			
Bore Size Range, mm	Incl.	Plus	Minus
Over			
18	80	200	0
80	120	200	-200
120	250	350	-250

**TABLE 3 Outer Ring (Cup) Outside Diameter Tolerance (Class K)**

Outer Ring O.D. (D)			
Size Range, mm	Incl.	Plus	Minus
Over			
80	120	0	-18
120	150	0	-20
150	180	0	-25
180	250	0	-30
250	315	0	-35

**TABLE 5 Maximum Radial Runout of Assembled Bearing (Class K)**

Maximum Radial Runout		
Outer Ring O.D. (D), mm	Incl.	Tolerance, μm
Over		
80	180	35
120	150	40
150	180	45
180	250	50
250	315	60