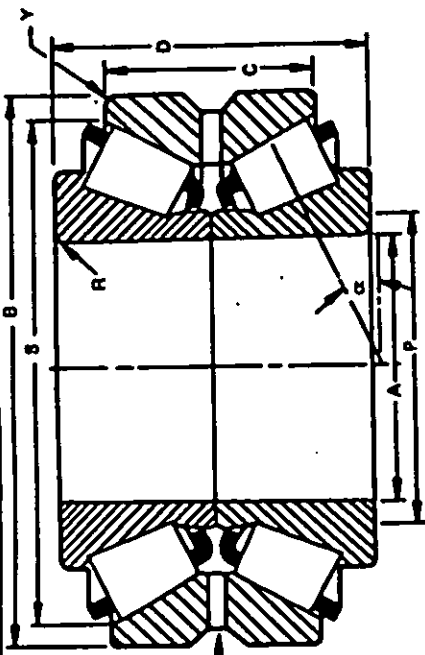


USERS ACTIVITIES:
Army - AV

REVIEWER ACTIVITIES:
Air Force - 99
Navy - SH, MC
DLA - IS
Other - PG

This military standard is approved for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

Dash No.	AFBMA bearing number (See Note 11) Cone-Cup	A	B	C	D	R	Y	P	S	K factor	Basic dynamic load ratings (lb) $\text{\textcircled{A}}$		FED. SPEC CLASS 3110
											Radial	Thrust	
		Bore	Outside dia.	Bearing width over cup	Cone width	Max. shaft fillet radius $\text{\textcircled{A}}$	Max. housing fillet radius $\text{\textcircled{A}}$	Shaft	Housing				
• 1	NA31075-2128D	0.7500	2.2500	1.4375	1.9375	0.06	0.03	1.24	2.01	0.99	3260	1730	
• 2	NA43131-43319D	-1.3125	3.1875	1.5625	2.1875	0.09	0.06	1.91	2.91	0.87	5500	3320	
• 10	NA44143-44363D	1.4375	3.6250	1.5625	2.1875	0.03	0.06	2.01	3.35	0.75	6050	4250	
• 3	NA44163-44363D	1.6250	3.6250	1.5625	2.1875	0.03	0.06	2.13	3.35	0.75	6050	4250	
• 4	NA53176-53390D	1.7500	3.8750	1.7500	2.5625	0.09	0.06	2.40	3.54	0.79	7350	4900	
• 5	NA55200-55444D	2.0000	4.4375	1.8125	2.5625	0.09	0.06	2.72	4.13	0.66	7900	6300	
• 6	NA66212-66462D	2.1250	4.6250	2.1250	2.8750	0.14	0.03	2.87	4.37	0.93	11100	6200	
• 11	NA72212-72488D	2.1250	4.8750	2.1875	3.0625	0.09	0.06	2.91	4.53	0.79	11900	7900	
• 7	NA9378-9320D	3.0000	7.0000	2.9375	4.3065	0.14	0.09	4.13	6.46	0.76	22800	15800	
• 8	NA98350-98789D	3.5000	7.8750	3.1581	4.5625	0.14	0.09	4.65	7.40	0.92	31500	17900	
• 9	NA97450-97901D	4.5000	9.0000	3.3125	4.5625	0.14	0.09	5.51	8.38	0.79	29800	19800	



P. A. OS Other Code AT 11	INTERNATIONAL INTEREST	TITLE BEARING, ROLLER, TAPERED, DOUBLE ROW OF ROLLERS, STEEP ANGLE, TWO SINGLE CONES, ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 767 (TNA)	MILITARY STANDARD MS 19089
PROCUREMENT SPECIFICATION FF-B-187	SUPERSIDES:		SHEET 1 OF 3

DD FORM 672-1 COORDINATED

3110-0520

* Inactive for new design after 13 Jan 82.

$\text{\textcircled{A}}$ denotes changes. For NOTES see sheets 2 and 3.

APPROVED 30 APR 59 REVISED $\text{\textcircled{A}}$ 13 JAN 82

USER ACTIVITIES:
Army - AV

REVIEWER ACTIVITIES:
Air Force - 98
Navy - SH, MC
DLA - IS
Other - NS

This military standard is approved for use by all Departments and Agencies of the Department of Defense. Schedule for all new engineering and design applications and for repetitive use shall be made from this document.

BEARINGS MANUFACTURED WITH CORRECT RUNNING CLEARANCE FOR THESE FITS.

Bearing bore A	Live shaft diameter limits		Dead shaft diameter limits		Housing	
	Tight fit	Loose fit	Tight fit	Loose fit	Live shaft bore limits	Dead shaft bore limits
0.7500	0.7515-0.7510	0.7500	0.7505	0.7500	2.2530-2.2520	2.2490-2.2480
1.3125	1.3140-1.3135	1.3125	1.3130	1.3125	3.1905-3.1895	3.1865-3.1855
1.4375	1.4390-1.4385	1.4375	1.4380	1.4375	3.6280-3.6270	3.6240-3.6230
1.6250	1.6265-1.6260	1.6250	1.6255	1.6250	3.6280-3.6270	3.6240-3.6230
1.7500	1.7515-1.7510	1.7500	1.7505	1.7500	3.8780-3.8770	3.8740-3.8730
2.0000	2.0020-2.0010	2.0000	2.0005	2.0000	4.4405-4.4395	4.4365-4.4355
2.1250	2.1270-2.1260	2.1250	2.1255	2.1250	4.6280-4.6270	4.6240-4.6230
2.1250	2.1270-2.1260	2.1250	2.1255	2.1250	4.8780-4.8770	4.8740-4.8730
3.0000	3.0025-3.0015	3.0000	3.0005	3.0000	7.0030-7.0020	6.9990-6.9980
3.5000	3.5030-3.5020	3.5000	3.5010	3.5000	7.8780-7.8770	7.8740-7.8730
4.5000	4.5035-4.5025	4.5000	4.5010	4.5000	9.0030-9.0020	8.9990-8.9980

NOTES:

- Ⓐ 1. MATERIAL: Cones, cups, and rollers: bearing quality - carburizing grade alloy or through-hardening grade alloy steel in accordance with FED-STD-66. Cups: carbon steel (stamped). Powdered process steel, e.g., Sinta Forge may be used.
- Ⓑ 2. HARDNESS: Cones, cups and rollers: 58 to 64 Rockwell C.
- 3. TOLERANCES: Standard grade (AFBMA Class 4) (allowable tolerances are in 0.0001 inch).

Assembled bearing maximum radial runout		
Cup O.D. (B)	Tolerance	
Over	Incl.	
0	24.0μ	20

Bearing width (C) Ⓐ		
Bore dia range		Tolerance
Over	Incl.	Plus
0	5.0000	100
5.0000	12.0000	300

Cup diameter (B)		
Size range		Tolerance
Over	Incl.	Plus
0.0000	12.0000	10
12.0000	24.0000	20

Cone bore (A) Ⓐ		
Size range		Tolerance
Over	Incl.	Plus
0	3.0000	5
3.0000	6.0000	10

- 4. DIMENSIONS: All dimensions are in inches. Dimensions P and S are recommended shaft and housing shoulder diameters. Dimensions R and Y are the maximum fillet radii on the shaft and the housing respectively, which will be cleared by the bearing corners.

P. A. OS Date Cont. AT 11	INTERNATIONAL INTEREST	TITLE BEARING, ROLLER, TAPERED, DOUBLE ROW OF ROLLERS, STEEP ANGLE, TWO SINGLE CONES, ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 767 (TNA)	MILITARY STANDARD MS 19089
PROCUREMENT SPECIFICATION FF-B-187	SUPERSEDES:	SHEET 2 OF 3	

USER ACTIVITIES:
Army - AV

REVIEWER ACTIVITIES:
Air Force - W
Navy - SH, MC
DLA - E
Other - PG

This military standard is approved for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P. A. OS D. C. AT 11	INTERNATIONAL INTEREST	TITLE BEARING, ROLLER, TAPERED, DOUBLE ROW OF ROLLERS, STEEP ANGLE, TWO SINGLE CONES, ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 767 (TNA)	MILITARY STANDARD MS 19089
	PROCUREMENT SPECIFICATION FF-B-187	SUPERSEDES:	SHEET 3 OF 3

DD FORM 672-1 COORDINATED

3110-0520

5. OPERATING TEMPERATURE: Recommended operating temperature not to exceed 121° Celsius (250° Fahrenheit).
6. LUBRICATION: Bearings shall be furnished without lubrication. Bearings shall be furnished with preservative per MIL-C-11796, Class 3.
7. BASIC DYNAMIC LOAD RATING: Basic dynamic load rating is that constant stationary load which a group of apparently identical bearings with stationary cups (outer rings) can endure for a rating life of 90 million revolutions of the cone (inner ring). The basic dynamic load ratings listed herein are based on a rated life of 90 million revolutions or 3000 hours at 500 r/min. To compare the load ratings on this document with others whose basis for rating are other than 90 million revolutions or 3000 hours at 500 r/min use the following formula:

$$C = \text{Other Bearing Rating} \times \left(\frac{R_1}{500}\right)^{1/f} \times \left(\frac{H_1}{3000}\right)^{1/f}$$
 where:
 R_1 = r/min at which other bearing is rated
 H_1 = Hours life at which other bearing is rated
 f = Other bearing fatigue factor
8. RATING LIFE (HOURS): Rating life is the number of hours at some constant speed of the cone (inner ring) that 90 percent of a group of apparently identical bearings will complete or exceed before first evidence of fatigue develops. The magnitude of the rated life in hours is found from the following:

$$L_{10} = \frac{1.5 \times 10^6}{R} \left(\frac{C}{P}\right)^{10/3}$$
 hours
 where:
 C = Basic dynamic load rating, lb.
 P = Equivalent load (combined radial and thrust load), lb.
 R = Revolutions per minute, r/min.
 The average life is approximately four times the rating life.
9. K FACTOR: The K factor is the ratio of the basic radial dynamic load rating (for a one-row bearing) to basic thrust dynamic load rating.
10. CONTACT ANGLE: All bearings are steep angle bearings having a contact angle (α) between 22 and 31 degrees. The contact angle is the angle between the line of action of the roller load and a plane perpendicular to the bearing axis.
11. PART NUMBER: The MS part number consists of the MS number, plus the dash number. Example: MS19089-3. The AFBMA (Anti-Friction Bearing Manufacturers Association) cup and cone numbers are for reference only and are not to be used for ordering purposes.
12. CAGE CLEARANCE: Designers should provide a clearance of .125 inch minimum between the outside edge of the cage and the housing counterbore.
13. For design feature purposes, this standard takes preference over procurement documents referenced herein.
14. Referenced documents shall be of the issue in effect on the date of invitation for bids, or request for proposal.

APPROVED 30 Apr 59 REVISED A For changes see sheets 1, 2, and 3.