

FED. SUP CLASS
3110USER ACTIVITIES:
Army — AVREVIEWER ACTIVITIES:
Air Force — 99
Navy — SH, MC
DLA — IS
Other — NSThis 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 ^(A) bearing number (See Note 11) Cone-Cup	A	B	C	D	R	Y	Recommended ^(A) shoulder diameter		^(A) K factor	Basic dynamic load ratings (lb) ^(A)	
								Shaft	Housing		Radial	Thrust
* 1	NA05075-05183D	0.7500	1.8504	0.9926	1.2500	0.05	0.03	1.00	1.67	1.64	1940	620
* 2	NA08125-08231D	1.2500	2.3125	0.9688	1.2812	0.06	0.02	1.52	2.17	1.23	2440	1040
* 3	NA13687-13621D	1.5000	2.7170	1.5000	1.8124	0.08	0.03	1.83	2.56	1.45	3600	1240
* 4	NA438-432D	1.7500	3.7500	2.0000	2.4376	0.14	0.03	2.24	3.43	2.05	8400	2040
23	NA366-363D	1.9685	3.5433	1.6563	1.9689	0.14	0.03	2.40	3.31	1.83	6300	1810
* 5	NA3780-3729D	2.0000	3.6718	2.0625	2.5625	0.14	0.03	2.52	3.46	1.73	9500	2890
6	NA455-452D	2.000	4.2500	2.1250	2.5626	0.14	0.03	2.56	3.94	1.74	10200	3090
24	NA539-533D	2.1250	4.3750	2.5000	3.1250	0.14	0.06	2.68	3.94	1.97	13100	3500
25	NA385-384D	2.1654	3.9370	1.6875	2.0625	0.14	0.03	2.64	3.66	1.65	6850	2180
* 7	NA558-552D	2.3750	4.8750	2.5000	3.1250	0.14	0.06	2.99	4.53	1.69	15100	4700
26	NA482-472D	2.7500	4.7244	2.1250	2.5626	0.14	0.03	3.27	4.49	1.52	11300	3900

P. A. OS
Other Cust
AT
11

INTERNATIONAL INTEREST

TITLE

BEARING, ROLLER, TAPERED, DOUBLE ROW
OF ROLLERS, NORMAL ANGLE, TWO SINGLE CONES,
ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 764 (TNA)

MILITARY STANDARD

MS 19088

PROCUREMENT SPECIFICATION
FF-B-187

SUPERSEDES:

SHEET 1 OF 6

DD FORM 672-1 (COORDINATED)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

3110-0519

^(A) denotes changes. For NOTES see sheets 5 and 6.

APPROVED 30 Apr 59

REVISED ^(A) 13 Jan 82

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REVIEWER ACTIVITIES:
Air Force — 99
Navy — SH, MC
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Other — NS

USER ACTIVITIES:
Army — AV

FED. SUP CLASS 3110													
Dash No.	AFBMA (A) bearing number (See Note 11) Cone-Cup	A	B	C	D	R	Y	P	S		K factor	Basic dynamic load ratings (lb) (A)	
									Recommended shoulder (A) diameter	Housing		Radial	Thrust
27	NA484-472D	2.7559	4.7244	2.1250	2.5626	0.14	0.03	3.27	4.49	1.52	11300	3900	
28	NA567-563D	2.8750	5.0000	2.5625	3.1875	0.27	0.06	3.70	4.69	1.61	15700	5100	
* 8	NA495A-493D	3.0000	5.3750	2.1250	2.7500	0.14	0.03	3.62	5.12	1.31	12500	5000	
9	NA659-654D	3.0000	6.0000	3.0000	3.7500	0.14	0.06	3.66	5.55	1.43	19500	7150	
*10	NA593-592D	3.5000	6.0000	2.5000	3.2500	0.14	0.03	4.09	5.67	1.32	17900	7100	
11	NA759-752D	3.5000	6.3750	3.3750	4.1250	0.14	0.06	4.17	5.91	1.71	26200	8050	
29	NA52375-52637D	3.7500	6.3750	2.4375	3.2499	0.14	0.03	4.41	6.06	1.23	18800	8050	
30	NA776-773D	3.7500	7.0866	3.3750	4.1250	0.14	0.03	4.49	6.61	1.51	28300	9850	
31	NA776-774D	3.7500	7.1250	3.3750	4.1250	0.14	0.06	4.49	6.61	1.51	28300	9850	
32	NA691-672D	4.0000	6.6250	2.7500	3.6250	0.14	0.03	4.65	6.30	1.24	21900	9250	
33	NA780-773D	4.0000	7.0866	3.3750	4.1250	0.14	0.03	4.69	6.61	1.51	28300	9850	
12	NA780-774D	4.0000	7.1250	3.3750	4.1250	0.14	0.06	4.69	6.61	1.51	28300	9850	
*13	NA861-854D	4.0000	7.5000	4.0000	5.0000	0.14	0.06	4.72	6.85	1.74	36900	11100	
34	NA782-773D	4.1250	7.0866	3.3750	4.1250	0.14	0.03	4.80	6.61	1.51	28300	9850	
35	NA782-774D	4.1250	7.1250	3.3750	4.1250	0.14	0.06	4.80	6.61	1.51	28300	9850	
14	NA71450-71751D	4.5000	7.5000	3.1875	4.1875	0.14	0.06	5.20	7.13	1.40	30200	11300	
15	NA938-932D	4.5000	8.3750	4.6250	5.6250	0.14	0.06	5.28	7.60	1.79	46500	13600	
36	NA48291-48220D	5.0000	7.1875	2.8750	3.3750	0.14	0.03	5.55	6.93	1.91	24600	6750	
*16	NA798-792D	5.0000	8.1250	3.2500	4.2500	0.14	0.03	5.71	7.80	1.27	32000	13200	
17	NA95500-95927D	5.0000	9.2500	4.5000	5.6250	0.14	0.06	5.87	8.54	1.58	52000	17300	
*18	NA81550-81963D	5.5000	9.6250	3.1250	4.2500	0.14	0.06	6.34	9.02	1.66	32700	10400	
37	NA48686-48620D	5.6250	7.8750	2.8750	3.6876	0.14	0.03	6.22	7.60	1.74	26600	8000	
38	NA82576-82951D	5.7500	9.5000	4.1875	5.1875	0.14	0.06	6.54	8.90	1.32	44000	17400	
19	NA99600-99102D	6.0000	10.0000	4.3750	5.6250	0.14	0.06	6.85	9.37	1.43	55500	20400	
P. A. OS		INTERNATIONAL INTEREST		TITLE				MILITARY STANDARD					
Other Cust				BEARING, ROLLER, TAPERED, DOUBLE ROW				MS 19088					
AT				OF ROLLERS, NORMAL ANGLE, TWO SINGLE CONES,									
11				ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 764 (TNA)									
PROCUREMENT SPECIFICATION		SUPERSEDES:		SHEET 2				OF 6					
FF-B-187													

FED. SUP CLASS
3110

APPROVED 30 Apr 59 REVISED (A) For changes see sheets 1 thru 6.

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.

REVIEWER ACTIVITIES:
Air Force — 99
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USER ACTIVITIES:
Army — AV

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) ^(A)	
											Radial	Thrust
39	NA67787-67720D	6.8750	9.7500	3.3125	4.0625	0.14	0.03	7.56	9.45	1.33	37100	14700
40	NA87700-87112D	7.0000	11.1250	3.1250	4.2500	0.14	0.06	7.87	10.50	1.41	34400	12200
20	NA94700-94114D	7.0000	11.3750	4.3750	5.6250	0.22	0.06	7.99	10.71	1.25	57000	24000
41	HM23754SNA- HM237510D	7.0000	11.3750	4.3750	5.6250	0.22	0.06	7.95	10.68	1.83	67500	19400
42	NA94700-94118D	7.0000	11.7500	4.3750	5.6250	0.22	0.06	7.99	10.71	1.25	57000	24000
43	H239649NA- H239612D	7.3750	12.6250	5.4375	7.3125	0.22	0.06	8.43	11.73	1.83	89000	24300
21	NA93800-93127D	8.0000	12.5000	4.3750	5.7500	0.22	0.06	9.06	11.81	1.12	65800	29400
*22	NA130902- 131401D	9.0000	14.0000	4.3750	5.7500	0.25	0.06	10.08	13.01	1.77	72200	20400
44	NA170950- 171451D	9.5000	14.5000	3.3750	4.7500	0.25	0.06	10.59	13.27	1.61	51000	15800

*Inactive for new design after 13 Jan 82.

P. A. OS Other Cust AT 11	INTERNATIONAL INTEREST	TITLE BEARING, ROLLER, TAPERED, DOUBLE ROW OF ROLLERS, NORMAL ANGLE, TWO SINGLE CONES, ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 764 (TNA)	MILITARY STANDARD MS 19088
PROCUREMENT SPECIFICATION FF-B-187		SUPERSEDES:	SHEET 3 OF 6

FED. SUP CLASS
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APPROVED : 30 Apr 59 REVISED ^(A) For changes see sheets 1 thru 6.

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Air Force — 99
Navy — SH, MC
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Other — NS

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BEARINGS MANUFACTURED WITH CORRECT RUNNING CLEARANCE FOR THESE FITS.				BEARINGS MANUFACTURED WITH CORRECT RUNNING CLEARANCE FOR THESE FITS.			
Dash No.	Live shaft diameter limits	Dead shaft diameter limits		Dash No.	Live shaft diameter limits	Dead shaft diameter limits	
		Tight fit	Loose fit			Tight fit	Loose fit
* 1	0.7515-0.7510	0.7505	0.7500	* 13	4.0030-4.0020	4.0010	4.0000
* 2	1.2515-1.2510	1.2505	1.2500	34	4.1280-4.1270	4.1260	4.1250
* 3	1.5015-1.5010	1.5005	1.5000	35	4.1280-4.1270	4.1260	4.1250
* 4	1.7515-1.7510	1.7505	1.7500	14	4.5035-4.5025	4.5010	4.5000
23	1.9700-1.9695	1.9690	1.9685	15	4.5035-4.5025	4.5010	4.5000
* 5	2.0020-2.0010	2.0005	2.0000	36	5.0035-5.0025	5.0010	5.0000
6	2.0020-2.0010	2.0005	2.0000	* 16	5.0035-5.0025	5.0010	5.0000
24	2.1270-2.1260	2.1255	2.1250	* 17	5.0035-5.0025	5.0010	5.0000
25	2.1674-2.1664	2.1659	2.1654	* 18	5.5040-5.5030		
* 7	2.3770-2.3760	2.3755	2.3750	37	5.6290-5.6280		
26	2.7525-2.7515	2.7505	2.7500	38	5.7540-5.7530		
27	2.7584-2.7574	2.7564	2.7559	19	6.0040-6.0030		
28	2.8775-2.8765	2.8755	2.8750	39	6.8795-6.8785		
* 8	3.0025-3.0015	3.0005	3.0000	40	7.0045-7.0035		
9	3.0025-3.0015	3.0005	3.0000	20	7.0045-7.0035		
* 10	3.5030-3.5020	3.5010	3.5000	41	7.0045-7.0035		
11	3.5030-3.5020	3.5010	3.5000	42	7.0045-7.0035		
29	3.7530-3.7520	3.7510	3.7500	43	7.3795-7.3785		
30	3.7530-3.7520	3.7510	3.7500	21	8.0050-8.0040		
31	3.7530-3.7520	3.7510	3.7500	* 22	9.0055-9.0045		
32	4.0030-4.0020	4.0010	4.0000	44	9.5060-9.5050		
33	4.0030-4.0020	4.0010	4.0000				
12	4.0030-4.0020	4.0010	4.0000				

BEARINGS MANUFACTURED WITH CORRECT RUNNING CLEARANCE FOR THESE FITS.				BEARINGS MANUFACTURED WITH CORRECT RUNNING CLEARANCE FOR THESE FITS.			
Dash No.	Live shaft diameter limits	Dead shaft diameter limits		Dash No.	Live shaft diameter limits	Dead shaft diameter limits	
		Tight fit	Loose fit			Tight fit	Loose fit
* 1	1.8494-1.8484	1.8474-1.8464	1.8454-1.8444	* 13	7.5030-7.5020	7.4990-7.4980	7.4950-7.4940
* 2	2.3115-2.3105	2.3095-2.3085	2.3075-2.3065	34	7.0896-7.0886	7.0856-7.0846	7.0816-7.0806
* 3	2.7160-2.7150	2.7140-2.7130	2.7120-2.7110	35	7.1240-7.1230	7.1200-7.1190	7.1160-7.1150
* 4	3.7490-3.7480	3.7470-3.7460	3.7450-3.7440	14	7.5030-7.5020	7.4990-7.4980	7.4950-7.4940
23	3.5423-3.5413	3.5393-3.5383	3.5373-3.5363	15	8.3780-8.3770	8.3740-8.3730	8.3700-8.3690
* 5	3.6708-3.6698	3.6688-3.6678	3.6668-3.6658	36	7.1905-7.1895	7.1865-7.1855	7.1825-7.1815
6	4.2490-4.2480	4.2470-4.2460	4.2450-4.2440	* 16	8.1280-8.1270	8.1240-8.1230	8.1200-8.1190
24	4.3740-4.3730	4.3720-4.3710	4.3700-4.3690	* 17	9.2530-9.2520	9.2490-9.2480	9.2450-9.2440
25	3.9360-3.9350	3.9340-3.9330	3.9320-3.9310	* 18	9.6280-9.6270	9.6240-9.6230	9.6200-9.6190
* 7	4.8740-4.8730	4.8720-4.8710	4.8700-4.8690	37	7.8780-7.8770	7.8740-7.8730	7.8700-7.8690
26	4.7234-4.7224	4.7214-4.7204	4.7194-4.7184	38	9.5030-9.5020	9.5000-9.5000	9.5000-9.5000
27	4.7234-4.7224	4.7214-4.7204	4.7194-4.7184	19	10.0030-10.0020	10.0000-10.0000	10.0000-10.0000
28	4.9990-4.9980	4.9970-4.9960	4.9950-4.9940	39	9.7530-9.7520	9.7500-9.7500	9.7500-9.7500
* 8	5.3740-5.3730	5.3720-5.3710	5.3700-5.3690	40	11.1280-11.1270	11.1250-11.1240	11.1210-11.1200
9	5.9990-5.9980	5.9970-5.9960	5.9950-5.9940	20	11.3780-11.3770	11.3750-11.3740	11.3710-11.3700
* 10	5.9990-5.9980	5.9970-5.9960	5.9950-5.9940	41	11.3780-11.3770	11.3750-11.3740	11.3710-11.3700
11	6.3740-6.3730	6.3720-6.3710	6.3700-6.3690	42	11.7530-11.7520	11.7500-11.7500	11.7500-11.7500
29	6.3740-6.3730	6.3720-6.3710	6.3700-6.3690	43	12.6310-12.6290	12.6280-12.6270	12.6240-12.6230
30	7.0856-7.0846	7.0836-7.0826	7.0816-7.0806	21	12.5060-12.5040	12.5030-12.5020	12.5000-12.5000
31	7.1240-7.1230	7.1220-7.1210	7.1200-7.1190	* 22	14.0060-14.0040	14.0030-14.0020	14.0000-14.0000
32	6.6240-6.6230	6.6220-6.6210	6.6200-6.6190	44	14.5060-14.5040	14.5030-14.5020	14.5000-14.5000
33	7.0856-7.0846	7.0836-7.0826	7.0816-7.0806				
12	7.1240-7.1230	7.1220-7.1210	7.1200-7.1190				

*Inactive for new design after 13 Jan 82.

FED. SUP CLASS
3110

APPROVED 30 Apr 59 REVISED A For changes see sheets 1 thru 6

MILITARY STANDARD
MS 19088

SHEET 4 OF 6

BEARING, ROLLER, TAPERED, DOUBLE ROW
OF ROLLERS, NORMAL ANGLE, TWO SINGLE CONES,
ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 764 (TNA)

PROCUREMENT SPECIFICATION
FF-B-187

SUPERSEDES:

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NOTES:

- (A) 1. MATERIAL: Cones, cups, and rollers: bearing quality - carburizing grade alloy or through-hardening grade alloy steel in accordance with FED-STD-66. Cage; carbon steel (stamped). Powdered process steel, e.g., Sinta Forge may be used.
- (A) 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).

Cone bore (A) (A)				Cup diameter (B)				Bearing width (C) (A)				Assembled bearing maximum radial runout			
Size range		Tolerance		Size range		Tolerance		Bore size range		Tolerance		Cup O.D. (B)		Tolerance	
Over	Incl.	Plus	Minus	Over	Incl.	Plus	Minus	Over	Incl.	Plus	Minus	Over	Incl.	Over	Minus
0	3.0000	5	0	0.0000	12.0000	10	0	0	5.0000	100	0				
3.0000	12.0000	10	0	12.0000	24.0000	20	0	5.0000	12.0000	300	0	0	24.0	0	20

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.
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.

- (A) 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

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PROCUREMENT SPECIFICATION FF-B-187	SUPERSEDES:		SHEET 5 OF 6

REVIEWER ACTIVITIES:
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Navy — SH, MC
DLA — IS
Other — NS

USER ACTIVITIES:
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P. A. OS Other Cust AT 11	INTERNATIONAL INTEREST	TITLE BEARING, ROLLER, TAPERED, DOUBLE ROW OF ROLLERS, NORMAL ANGLE, TWO SINGLE CONES, ONE DOUBLE CUP, NON-ADJUSTABLE, TYPE 764 (TNA)	MILITARY STANDARD MS 19088
PROCUREMENT SPECIFICATION			SHEET 6 OF 6
SUPERSEDES:			

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:

$$L_{10} = \frac{1.5 \times 10^6}{R} \left(\frac{C}{P} \right)^{10/3} \text{ hours}$$

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 normal angle bearings having a contact angle (α) 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.
11. PART NUMBER: The MS part number consists of the MS number, plus the dash number. Example: MS19088-17. 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 precedence 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.

15. TABLE II, a numerical listing of dash numbers cross-referenced to bore size A, is included as information to assist in locating a known dash number in TABLE I.

TABLE II

Dash No.	Bore A	Dash No.	Bore A	Dash No.	Bore A
1	0.7500	12	4.0000	23	1.9685
2	1.2500	13	4.0000	24	2.1250
3	1.5000	14	4.5000	25	2.1654
4	1.7500	15	4.5000	26	2.7500
5	2.0000	16	5.0000	27	2.7559
6	2.0000	17	5.0000	28	2.8750
7	2.3750	18	5.5000	29	3.7500
8	3.0000	19	6.0000	30	3.7500
9	3.0000	20	7.0000	31	3.7500
10	3.5000	21	8.0000	32	4.0000
11	3.5000	22	9.0000	33	4.0000
				34	4.1250
				35	4.1250
				36	5.0000
				37	5.6250
				38	5.7500
				39	6.8750
				40	7.0000
				41	7.0000
				42	7.0000
				43	7.3750
				44	9.5000

FED. SUP CLASS
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APPROVED 30 Apr 59 REVISED A For changes see sheets 1 thru 6.