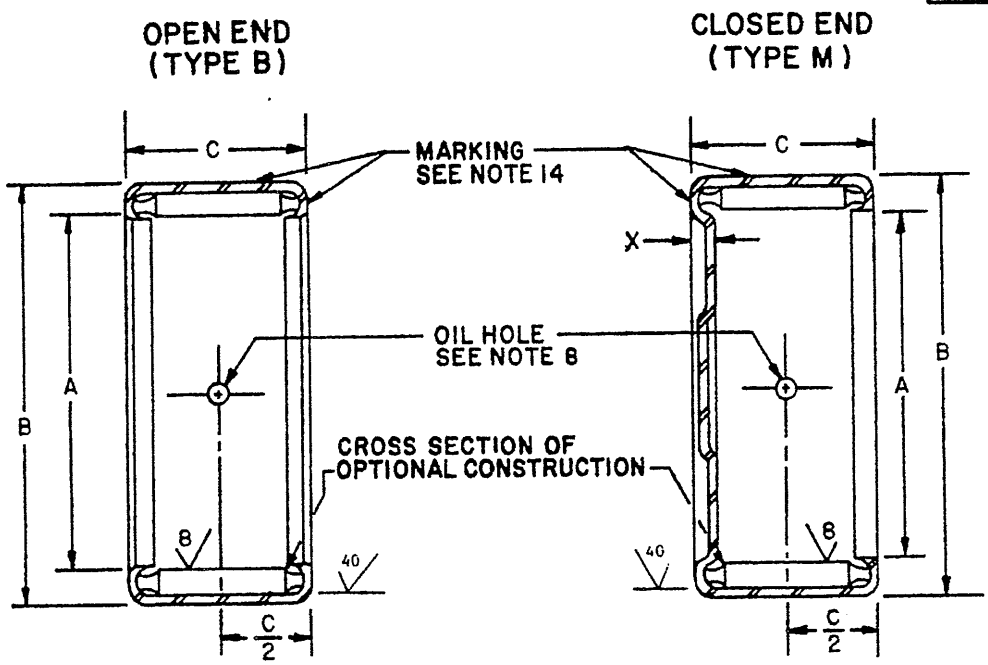
FED. SUP CLASS
3110



(NOTE 14) (NOTE 3) (NOTE 5) (NOTE 3) (H) (NOTE 9) (NOTE 10) (NOTE 12)

MS DASH NO.		A BORE			B DIA		C WIDTH +.000 -.010	SHAFT DIA		BASIC STATIC LOAD RATING LB	BASIC DYNAMIC LOAD RATING LB	APPROX. LIMITING SPEED RPM	X END THICK-NESS MAX.
TYPE "B"	TYPE "M"	NOM	MIN	MAX	RING GAGE	OUTSIDE NOM		MIN	MAX				
-1	-1M	1/8	.1258	.1267	.2505	1/4	.250	.1247	.1250	221	236	12500	.05
-2	-2M	5/32	.1571	.1580	.2817	9/32	.312	.1560	.1563	387	374	10700	.05
-3	-3M	3/16	.1883	.1892	.3437	11/32	.250	.1872	.1875	283	309	10700	.07
-4	-4M	3/16	.1883	.1892	.3437	11/32	.375	.1872	.1875	575	537	10700	.07
-5	-5M	1/4	.2515	.2524	.4380	7/16	.312	.2495	.2500	482	498	10000	.09
-6	-6M	1/4	.2515	.2524	.4380	7/16	.438	.2495	.2500	865	786	10000	.09
-7	-7M	5/16	.3140	.3149	.5005	1/2	.312	.3120	.3125	578	573	8300	.09
-8	-8M	5/16	.3140	.3149	.5005	1/2	.438	.3120	.3125	1040	903	8300	.09
-9	-9M	3/8	.3765	.3774	.5630	9/16	.375	.3745	.3750	941	826	7100	.09
-10	-10M	3/8	.3765	.3774	.5630	9/16	.500	.3745	.3750	1480	1180	7100	.09
-11	-11M	7/16	.4390	.4399	.6255	5/8	.500	.4370	.4375	1690	1280	6300	.09
-12	-12M	1/2	.5015	.5024	.6880	11/16	.375	.4995	.5000	1210	968	5500	.09
-13	-13M	1/2	.5015	.5024	.6880	11/16	.500	.4995	.500	1900	1380	5500	.09
-14	-14M	1/2	.5015	.5024	.6880	11/16	.750	.4995	.5000	3280	2100	5500	.09
-64	-64M	1/2	.5015	.5024	.6880	11/16	.312	.4995	.5000	867	748	5500	.09
-65	-65M	1/2	.5015	.5024	.6880	11/16	.625	.4995	.5000	2590	1750	5500	.09
-15	-15M	9/16	.5640	.5649	.7505	3/4	.375	.5620	.5625	1340	1030	5000	.09
-16	-16M	9/16	.5640	.5649	.7505	3/4	.500	.5620	.5625	2110	1470	5000	.09
-17	-17M	9/16	.5640	.5649	.7505	3/4	.750	.5620	.5625	3640	2240	5000	.09
-18	-18M	5/8	.6265	.6274	.8130	13/16	.500	.6245	.6250	2320	1560	4500	.08
-19	-19M	5/8	.6265	.6274	.8130	13/16	.750	.6245	.6250	4010	2380	4500	.08
-66	-66M	5/8	.6265	.6274	.8130	13/16	.312	.6245	.6250	1060	846	4500	.08
-67	-67M	5/8	.6265	.6274	.8130	13/16	.437	.6245	.6250	1900	1330	4500	.08
-20	-20M	11/16	.6890	.6899	.8755	7/8	.500	.6870	.6875	2530	1640	4200	.08
-21	-21M	11/16	.6890	.6899	.8755	7/8	.750	.6870	.6875	4370	2510	4200	.08
-22	-22M	3/4	.7505	.7514	.9995	1	.500	.7495	.7500	2630	2000	5300	.09
-23	-23M	3/4	.7505	.7514	.9995	1	.750	.7495	.7500	4700	3140	5300	.09

(H) DENOTES CHANGES

APPROVED 7 JAN 1960 REVISED (A) 22 NOV 1961 (B) 28 APR 1965 (C) 23 MAY 1975 (D) 25 JUL 1975 (E) 4 AUGUST 1978 (L) 30 APRIL 1980 (G) 19 SEPT 1980 (H) 8 NOV 1983

REVIEW ACTIVITIES: ARMY-AV, MI, ME; AF-99; DLA-IS
USER ACTIVITIES: NAVY-YD, MC, SH; ARMY-GL, AR

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 when applicable.

P.A. AT Other Cust NAVY-OS AF-11	TITLE BEARING, ROLLER, NEEDLE: DRAWN OUTER RING, FULL COMPLEMENT, WITHOUT INNER RING, OPEN AND CLOSED END, STANDARD TYPE	MILITARY STANDARD MS17131
PROCUREMENT SPECIFICATION NONE	SUPERSEDES: CAZX2, CAZX2.1, CAZX3, CAZX3.1, CAZX5, CAZX5.1, and CAZX5.2 in part	SHEET 1 OF 4

DD FORM 1 SEP 67 672-1 PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE. 3110-0722

FED. SUP CLASS
3110

(NOTE 14)		(NOTE 3)	(NOTE 5)		(NOTE 3)		(H)			(NOTE 9)	(NOTE 10)	(NOTE 12)	
MS DASH NO.		A BORE			B DIA		C WIDTH	SHAFT DIA		BASIC STATIC LOAD RATING LB.	BASIC DYNAMIC LOAD RATING LB.	APPROX. LIMITING SPEED RPM	X END THICK-NESS MAX.
TYPE "B"	TYPE "M"	NOM	MIN	MAX	RING GAGE	OUTSIDE NOM	+.000 -.010	MIN	MAX				
-68	-68M	13/16	.8130	.8139	1.0620	1-1/16	.375	.8120	.8125	1710	1410	5200	.09
-24	-24M	13/16	.8130	.8139	1.0620	1-1/16	.500	.8120	.8125	2820	2090	5000	.09
-25	-25M	13/16	.8130	.8139	1.0620	1-1/16	1.000	.8120	.8125	7280	4360	5000	.09
-69	-69M	7/8	.8755	.8764	1.1245	1-1/8	.500	.8745	.8750	3020	2170	4800	.09
-26	-26M	7/8	.8755	.8764	1.1245	1-1/8	.750	.8745	.8750	5400	3420	4500	.09
-27	-27M	7/8	.8755	.8764	1.1245	1-1/8	1.000	.8745	.8750	7780	4540	4500	.09
-28	-28M	15/16	.9380	.9389	1.1870	1-3/16	1.000	.9370	.9375	8280	4720	4400	.09
-70	-70M	1	1.0005	1.0014	1.2495	1-1/4	.437	.9995	1.0000	2730	1980	4300	.09
-71	-71M	1	1.0005	1.0014	1.2495	1-1/4	.500	.9995	1.0000	3410	2350	4300	.09
-29	-29M	1	1.0005	1.0014	1.2495	1-1/4	.750	.9995	1.0000	6100	3690	4100	.09
-30	-30M	1	1.0005	1.0014	1.2495	1-1/4	1.000	.9995	1.0000	8780	4900	4100	.09
-31	-31M	1-1/16	1.0630	1.0639	1.3120	1-5/16	.625	1.0620	1.0625	5020	3140	3800	.09
-32	-32M	1-1/8	1.1255	1.1264	1.3745	1-3/8	.750	1.1245	1.1250	6790	3930	3600	.09
-33	-33M	1-1/8	1.1255	1.1264	1.3745	1-3/8	1.000	1.1245	1.1250	9790	5220	3600	.09
-34	-34M	1-3/16	1.1880	1.1889	1.4995	1-1/2	.625	1.1870	1.1875	5100	3430	4400	.11
-35	-35M	1-1/4	1.2505	1.2514	1.4995	1-1/2	1.000	1.2495	1.2500	10800	5530	3300	.09
-36	-36M	1-1/4	1.2505	1.2514	1.4995	1-1/2	1.250	1.2495	1.2500	14100	6800	3300	.09
-37	-37M	1-5/16	1.3130	1.3140	1.6245	1-5/8	.500	1.3120	1.3125	3840	2710	4000	.11
-38	-38M	1-5/16	1.3130	1.3140	1.6245	1-5/8	.625	1.3120	1.3125	5590	3630	4000	.11
-39	-39M	1-3/8	1.3755	1.3765	1.6245	1-5/8	.750	1.3745	1.3750	8190	4370	3000	.09
-40	-40M	1-3/8	1.3755	1.3765	1.6245	1-5/8	1.250	1.3745	1.3750	15400	7140	3000	.09
-41	-41M	1-1/2	1.5005	1.5016	1.8745	1-7/8	.625	1.4995	1.5000	6200	4220	4300	.12
-42	-42M	1-1/2	1.5005	1.5016	1.8745	1-7/8	1.000	1.4995	1.5000	12300	7170	4300	.12
-43	-43M	1-1/2	1.5005	1.5016	1.8745	1-7/8	1.250	1.4995	1.5000	16300	8940	4300	.12
-44	-44M	1-5/8	1.6255	1.6266	1.9995	2	.625	1.6245	1.6250	6620	4350	3900	.12
-45	-45M	1-5/8	1.6255	1.6266	1.9995	2	1.250	1.6245	1.6250	17500	9260	3900	.12
-46	-46M	1-3/4	1.7505	1.7517	2.1245	2-1/8	.750	1.7495	1.7500	9400	5620	3600	.12
-47	-47M	1-3/4	1.7505	1.7517	2.1245	2-1/8	1.000	1.7495	1.7500	14000	7880	3600	.12
-48	-48M	1-3/4	1.7505	1.7517	2.1245	2-1/8	1.500	1.7495	1.7500	23300	11400	3600	.12
-49	-49M	1-7/8	1.8755	1.8767	2.2495	2-1/4	.500	1.8745	1.8750	5140	3500	3500	.12
-50	-50M	1-7/8	1.8755	1.8767	2.2495	2-1/4	1.000	1.8745	1.8750	15000	6080	3500	.12
-51	-51M	2	2.0006	2.0018	2.3745	2-3/8	1.000	1.9994	2.0000	15900	6300	3300	.12
-52	-52M	2	2.0006	2.0018	2.3745	2-3/8	1.750	1.9994	2.0000	31700	14200	3300	.12
-53	-53M	2-1/8	2.1256	2.1270	2.4995	2-1/2	1.000	2.1244	2.1250	16800	8510	3000	.12
-54	-54M	2-1/8	2.1256	2.1270	2.4995	2-1/2	1.500	2.1244	2.1250	28000	12600	3000	.12
-55	-55M	2-1/4	2.2506	2.2520	2.6245	2-5/8	.750	2.2494	2.2500	12000	6570	3000	.12
-56	-56M	2-1/4	2.2506	2.2520	2.6245	2-5/8	1.500	2.2494	2.2500	29600	13300	3000	.13
-57	-57M	2-1/2	2.5006	2.5020	2.8795	2-7/8	1.500	2.4994	2.5000	32700	13900	2700	-
-58	-58M	2-5/8	2.6260	2.6274	2.9995	3	1.000	2.6244	2.6250	20600	9570	2500	.13
-59	-59M	2-3/4	2.7510	2.7524	3.1245	3-1/8	1.000	2.7494	2.7500	21600	9870	2500	.13
-60	-60M	2-3/4	2.7510	2.7524	3.1245	3-1/8	1.250	2.7494	2.7500	28700	12300	2500	.13
-61	-61M	3-1/2	3.5010	3.5024	3.9995	4	.750	3.4994	3.5000	16900	9270	2700	-
-62	-62M	5-1/2	5.5010	5.5029	5.9990	6	.750	5.4993	5.5000	25100	10800	1600	-
-63	-63M	7-1/4	7.2510	7.2530	7.7490	7-3/4	.750	7.2490	7.2500	32700	12500	1200	-

APPROVED 7 JAN 1960 REVISED (H) FOR CHANGES SEE SHEETS 1, 2, AND 3

P.A.
Other Cust

TITLE BEARING, ROLLER, NEEDLE: DRAWN OUTER RING, FULL COMPLEMENT, WITHOUT INNER RING, OPEN AND CLOSED END, STANDARD TYPE

MILITARY STANDARD

MS17131

PROCUREMENT SPECIFICATION

SUPERSEDES:

MATERIAL: ROLLERS - STEEL, ALLOY OR CARBON, E50100, E51100, E52100 OR 1090 OR 1095 PER FED-STD-66 OR SAE J-404.
RING - STEEL, ALLOY OR CARBON, CARBURIZING GRADE, 4620, 4720, 8620, 8720 OR 1010-1020 PER FED-STD-66.

(H) HEAT TREATMENT: NEEDLE ROLLERS - THROUGH HARDENED TO ROCKWELL HRC58 MIN. OR EQUIVALENT. RING - CASE HARDENED TO SURFACE HARDNESS ROCKWELL HRC58-65 OR EQUIVALENT. CASE DEPTH 0.003 MIN. WILL NOT SUPPORT ROCKWELL HR15N. REQUIRES USE OF A STANDARD FILE TEST OR MICRO SECTION AND MICRO HARDNESS TEST.

SURFACE FINISH: SURFACES MARKED 8✓ AND 40✓ SHALL HAVE MAXIMUM SURFACE ROUGHNESS AS INDICATED, PER ANSI B46.1.

PROTECTIVE COATING: PLAIN (NOT PLATED). BEARINGS TO BE COATED WITH RUST PREVENTIVE FILM BY MANUFACTURER.

LUBRICATION: BEARINGS SHALL BE FURNISHED WITHOUT LUBRICATION.

NOTES:

1. ROLLERS SHALL BE RETAINED BY THE OUTER RING.
2. BEARINGS SHALL NOT BE FURNISHED WITH ROLLER SEPARATORS.
3. THE "GO" PLUG GAGE IS THE SAME SIZE AS THE MINIMUM DIAMETER UNDER THE NEEDLE ROLLERS, AND THE "NO GO" PLUG GAGE SIZE IS .0001 INCH LARGER THAN THE MAXIMUM DIAMETER UNDER THE NEEDLE ROLLERS. INSPECTION OF THE BEARING BORE SHOULD BE MADE WITH THE BEARING PRESSED INTO A RING GAGE OF THE SIZE SHOWN IN THE RING GAGE DIAMETER COLUMN.
4. a. BEARINGS ARE INTENDED TO BE INSTALLED ON SHAFTS WHERE MAXIMUM DEFLECTION DOES NOT EXCEED 0.0010 INCHES PER INCH OF BEARING WIDTH.

   b. APPLICATIONS INVOLVING OSCILLATING MOTION OFTEN REQUIRE REDUCED RADIAL CLEARANCES. THIS REDUCTION IS ACCOMPLISHED BY INCREASING THE SHAFT RACEWAY DIAMETERS BY .0003 FOR BEARINGS WITH BORES 3/32 TO 3/16; .0005 FOR BEARINGS WITH BORES 1/4 TO 1 7/8; .0006 FOR BEARINGS WITH BORES 2 TO 5 1/2.
5. BEARINGS ARE INTENDED TO BE USED WITH HARDENED SHAFTS RC58-65. WHEN OPEN END BEARING IS USED WITH UNHARDENED SHAFT, BEARING SHOULD BE USED IN CONJUNCTION WITH RING, BEARING, INNER, MS17130 SHOWN AS BEARING ASSEMBLIES ON MS500087.
6. (H) STEEL HOUSING BORE DIAMETER DIMENSIONS ARE AS FOLLOWS: RING GAGE DIAMETER PLUS .0005 MINUS .0000 FOR BEARING OUTSIDE DIAMETERS THRU 11/32; RING GAGE DIAMETER PLUS .0010 MINUS .0000 FOR BEARING OUTSIDE DIAMETERS 7/16 THRU 5; RING GAGE DIAMETER PLUS .0020 MINUS .0000 5-1/16 AND GREATER.
7. (H) MOUNTING IN CONFORMANCE WITH THE SHAFT DIAMETERS AND HOUSING BORE DIAMETERS RESULTS IN THE FOLLOWING RADIAL CLEARANCES: .0005 TO .002 FOR BEARINGS WITH BORE DIAMETERS UP TO AND INCLUDING 3/16; .0005 TO .0029 FROM 1/4 THROUGH 1-1/4; .0005 TO .003 FROM 1-6/16 THRU 1-3/8; .0005 TO .0031 FROM 1-1/2 THRU 1-5/8; .0005 TO .0032 FROM 1-3/4 THRU 1-7/8; .0006 TO .0034 FOR 2; .0006 TO .0036 FROM 2-1/8 THRU 2-1/2; .001 TO .004 FROM 2-5/8 THRU 3-1/2; .001 TO .0056 FOR 5-1/2; .001 TO .0059 FOR 7-1/4.
8. OIL HOLE SHALL BE FURNISHED IN ACCORDANCE WITH MANUFACTURER'S STANDARD PRACTICE.
9. THE "BASIC STATIC LOAD RATING" FOR A RADIAL ROLLER BEARING IS THAT STATIC RADIAL LOAD WHICH CORRESPONDS TO A COMBINED TOTAL PERMANENT DEFORMATION OF ROLLER PLUS RACEWAY, AT THE MOST HEAVILY STRESSED CONTACT, OF .0001 OF THE ROLLER DIAMETER.
10. THE "BASIC DYNAMIC LOAD RATING" FOR A RADIAL ROLLER BEARING IS THAT CALCULATED, CONSTANT, RADIAL LOAD WHICH A GROUP OF APPARENTLY IDENTICAL BEARINGS WITH STATIONARY OUTER RING CAN THEORETICALLY ENDURE FOR A RATING LIFE OF ONE MILLION REVOLUTIONS OF THE INNER RING. THE RATING LIFE IS DEFINED AS THE NUMBER OF REVOLUTIONS THAT 90% OF A GROUP OF BEARINGS WILL COMPLETE OR EXCEED BEFORE THE FIRST EVIDENCE OF FATIGUE DEVELOPS. 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.
11. FOR RATING LIVES AT LOADS OTHER THAN THE BASIC DYNAMIC LOAD RATINGS AT OPERATING CONDITIONS OF THE INNER RING ROTATING, OUTER RING STATIONARY, STEADY LOAD, UNIFORM RPM, THOROUGH LUBRICATION, 300° F MAXIMUM BEARING TEMPERATURE, SHAFT MISALINEMENT NOT TO EXCEED .0010 INCHES PER INCH OF BEARING WIDTH.
12. LIMITING SPEED CALCULATED AT 300° F MAXIMUM WITH THOROUGH LUBRICATION AT BASIC LOAD.
    EMPIRICAL FORMULA FOR LOAD-LIFE RELATIONSHIP:

    $L = \left[\frac{Cr}{P}\right]^{\frac{10}{3}}$, WHERE L = RATING LIFE, MILLIONS OF REVOLUTIONS.
    Cr = BASIC DYNAMIC LOAD,RATING, LB.
    P = EQUIVALENT RADIAL LOAD TO WHICH BEARING IS SUBJECTED, LB.

    FOR AN APPLIED LOAD GREATER THAN ONE-HALF THE BASIC DYNAMIC LOAD RATING, THE ABOVE LOAD-LIFE RELATIONSHIP IS NOT VALID.

APPROVED 7 JAN 1960 REVISED (H) FOR CHANGES SEE SHEETS 1, 2, AND 3

13. AVERAGE LIFE, THE LIFE WHICH 50% OF A GROUP OF BEARINGS WILL COMPLETE BEFORE EVIDENCE OF FATIGUE DEVELOPS, IS APPROXIMATELY FIVE (5) TIMES THE RATING LIFE.

14. THE MS PART NUMBER SHALL CONSIST OF THE MS NUMBER PLUS THE DASH NUMBER. EXAMPLE: MS17131-1 FOR OPEN END BEARING; MS17131-1M FOR CLOSED END BEARING. MARKING SHALL CONSIST OF THE MS PART NUMBER AND THE MANUFACTURER'S IDENTIFICATION IN ACCORDANCE WITH MIL-STD-130.

15. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATION FOR BIDS OR REQUEST FOR PROPOSAL, EXCEPT THAT REFERENCED ADOPTED INDUSTRY DOCUMENTS SHALL GIVE THE DATE OF THE ISSUE ADOPTED.

16. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.

17. THE USE OF RECYCLED MATERIALS WHICH MEET THE REQUIREMENTS OF THE APPLICABLE MATERIAL SPECIFICATION WITHOUT JEOPARDIZING THE INTENDED USE OF THE ITEM SHALL BE ENCOURAGED.

18. DIMENSIONS ARE IN INCHES.

APPROVED 7 JAN 1960 REVISED (H) FOR CHANGES SEE SHEETS 1, 2, AND 3

P.A. Other Cust	TITLE BEARING, ROLLER, NEEDLE:DRAWN OUTER RING, FULL COMPLEMENT, WITHOUT INNER RING, OPEN AND CLOSED END, STANDARD TYPE	MILITARY STANDARD MS17131
PROCUREMENT SPECIFICATION	SUPERSEDES:	SHEET 4 OF 4