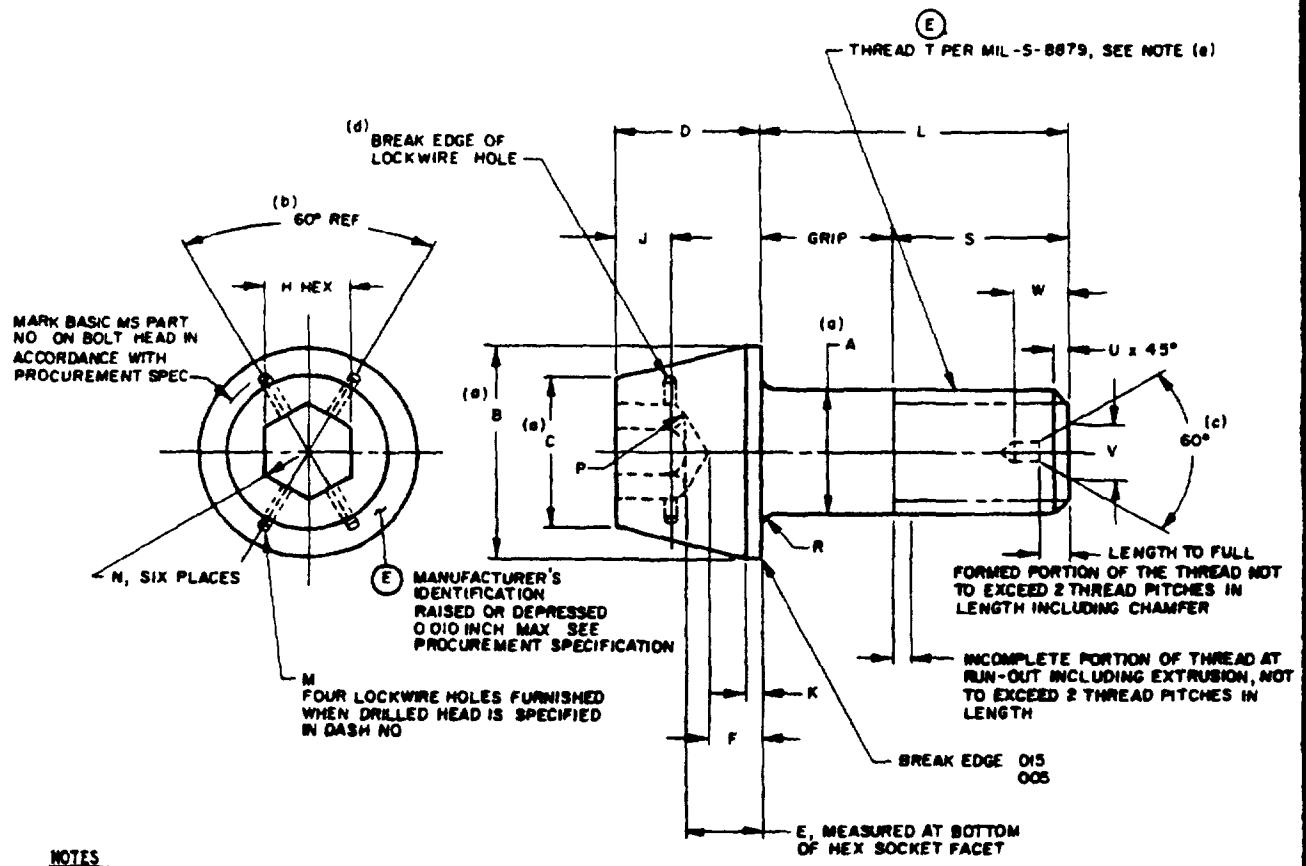


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODISS SPECIFIED IN THE SOLICITATION MIL-B-7838



NOTES

- (a) DIMENSIONS A, B AND C SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR X TOTAL INDICATOR READING. DIMENSIONS SHALL BE H AND C SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR Y TOTAL INDICATOR READING. DIMENSION A AND THREAD PITCH DIAMETER SHALL BE CONCENTRIC TO EACH OTHER WITHIN VALUES SPECIFIED FOR Z TOTAL INDICATOR READING.
- (b) REFERENCE DIMENSIONS ARE FOR DESIGN PURPOSES AND TO PROVIDE INFORMATION ONLY. THESE DIMENSIONS ARE NOT INSPECTION OR MANUFACTURING REQUIREMENTS. S MIN REF = (L MIN) - (GRIP MAX).
- (c) ON MS20012 THRU MS20024 CENTER DRILLING OF SHANK IS OPTIONAL FOR BOLT MANUFACTURER.
- (d) COUNTERSINKING OF DRILLED HOLES IS OPTIONAL.
- (e) MS20016 (SEE TABLE I), 1-14NS-3A IS INACTIVE FOR NEW DESIGN MS20016 THREADS ARE NOTED AS AN EXCEPTION IN MIL-B-7838
- (f) MS20012A IS CANCELLED AFTER 13 JANUARY 1990

REQUIREMENTS

- 1 MATERIAL ALLOY STEEL - UNS G43400, UNS G43406, UNS G41400, UNS G87400, UNS G87350
 - 2 FINISH CADMIUM PLATING PER QQ-P-416, TYPE II, CLASS 2 PARTS WITH CLASS 3 PLATING MAY BE FURNISHED FROM SUPPLIER'S STOCK UNTIL 1 JANUARY 1975.
 - 3 HARDNESS 34-40 HRC
 - 4 DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED. TOLERANCES DECIMALS - .010, ANGLES ±1°
 - 5 DIMENSIONS TO BE MET AFTER PLATING
- BOLTS WITH TYPE II PLATING CAN BE USED TO REPLACE BOLTS WITH TYPE I PLATING IN ALL APPLICATIONS
BOLTS WITH TYPE I PLATING CAN BE USED IN PLACE OF BOLTS WITH TYPE II PLATING UNTIL PRESENT STOCKS ARE DEPLETED, BUT BOLTS WITH TYPE I PLATING SHALL NOT BE USED AFTER 1 JANUARY 1964

FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATIONS FOR BID

(E) DENOTES CHANGES

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY-AR NAVY- AIR FORCE-99 DLA- REVIEW ARMY - ER, ME, MI DLA - IS AF-82 USER ARMY - AV PROJECT NUMBER 5306-123E	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 100 KSI FTU AND 50 KSI FSL	SPECIFICATION SHEET NUMBER 30 MAY 1969 MS20004E THRU 20024E SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1961 AMSC- N/A FSC 5306
DISTRIBUTION STATEMENT A Approved for public release distribution is unlimited		Page 1 of 4

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODISS SPECIFIED IN THE SOLICITATION MIL-B-7038

(E)

TABLE I BOLT DIMENSIONS AND TENSILE STRENGTH

BASIC MS PART NO	(a) THREAD T	(a) A DIA		(a) B DIA		(a) C DIA	D	E	F MIN	(a) H HEX		J	K	M +.005 - .000 DIA	N MAX RAD
		MAX	MIN	MAX	MIN					MAX	MIN				
		MS20004	1/4-28 UNJF-3A	.2492	.2477					.438	.428				
MS20005	5/16-24 UNJF-3A	.3117	.3102	.531	.521	.394	.312	.144	.094	.2210	.2190	.094			
MS20006	3/8-24 UNJF-3A	.3742	.3727	.649	.639	.520	.375	.183	.116	3150	.3130	.125			
MS20007	7/16-20 UNJF-3A	.4367	.4347	.750	.740	.534	.438	.208	.141			.156			
MS20008	1/2-20 UNJF-3A	.4991	.4971	.828	.818	.625	.500	.247	.169	.3785	.3755	.172			
MS20009	9/16-18 UNJF-3A	.5616	.5596	.938	.928	.723	.562	.279	.190	.4410	.4380	.203			
MS20010	5/8-18 UNJF-3A	.6240	.6220	1.050	1.040	.826	.625	.317	.216	.5035	.5005	.234			
MS20012	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	.5660	.5630	.281			
MS20014	7/8-14 UNJF-3A	.8737	.8707	1.438	1.428	1.083	.875	.450	.327	.6295	.6257	.344			
MS20016	1-14 NS-3A												094	.055	.019
MS20017	1-12 UNJF-3A	.9985	.9955	1.625	1.615	1.249	1.000	.527	.381	.7547	.7507	.391			
MS20018	1-1/8-12 UNJF-3A	1.124	1.121	1.875	1.865	1.275	1.125	.589	.443			.453			
MS20020	1-1/4-12 UNJF-3A	1.249	1.246	2.125	2.115	1.598	1.250	.667	.475	1.005	1.001	.500			
MS20022	1-3/8-12 UNJF-3A	1.374	1.370	2.313	2.303	1.768	1.375	.746	.531	1.131	1.126	.547			
MS20024	1-1/2-12 UNJF-3A	1.499	1.495	2.500	2.490	1.931	1.500	.823	.586	1.256	1.251	.594			
MS20024	1-1/2-12 UNJF-3A	1.499	1.495	2.500	2.490	1.931	1.500	.823	.586	1.256	1.251	.594			
MS20024	1-1/2-12 UNJF-3A	1.499	1.495	2.500	2.490	1.931	1.500	.823	.586	1.256	1.251	.594			
MS20024	1-1/2-12 UNJF-3A	1.499	1.495	2.500	2.490	1.931	1.500	.823	.586	1.256	1.251	.594			

(E) SEE NOTE (f)

TABLE I (CONTINUED)

BASIC MS PART NO	P RAD		(b) S MIN REF	U ±.016	(c) V MAX	(c) W MAX	(b) (c) CENTER DRILL SIZE REF	TENSILE STRENGTH LB MIN	(a) CONCENTRICITY		
	MAX	MIN							MAX	MIN	X
MS20004	020	010	.475	.031				6,190	.005	.007	0045
MS20005			.537					9,820	.006	.008	
MS20006			.662					15,200	.008	.010	
MS20007			.787	.047				20,600	.009	.011	
MS20008			.850					27,400	.010	.012	
MS20009			.912					34,800	.011	.014	
MS20010			.975	.062				43,600	.012	.016	
MS20012			1.037		187	200	2	63,200	.015	.018	
MS20014			1.162					86,100	.018	.022	
MS20016			1.287	.078				112,000	.020	.025	
MS20017	1.475		250	260	3	114,000	.022	.026			
MS20018	1.600					144,000	.025	.032			
MS20020	1.725	.094				180,000	.028	.035			
MS20022	1.850		.312	320	4	219,000	.030	.039			
MS20024	1.975					263,000	.030	.039			
MS20024	2.100	.062	187	200	2	63,200	.015	.018			

(E) SEE NOTE (f)

* SEE NOTE (a)

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY - AP NAVY - AIR FORCE - 99 DLA - ARMY - EP, ME, MI DLA - IS AF - RC REVIEW USER ARMY - AV PROJECT NUMBER 5306-1233	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 96 KSI FSU	SPECIFICATION SHEET NUMBER 30 MAY 1989 MS20004E THRU 20024E SUPERSEDING MS20004E THRU 20024D 10 AUGUST 1981 AMSC - N/A FSC 5306
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TABLE 11 DASH NOS , GRIP LENGTHS AND BOLT LENGTH

DASH NO	GRIP = 010	LENGTH = D15															
		MS20004	MS20005	MS20006	MS20007	MS20008	MS20009	MS20010	MS20012	MS20014	MS20016	MS20017	MS20018	MS20020	MS20022	MS20024	
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1	1-1/8	1-1/4	1-3/8	1-1/2	
4	.250	.750															
6	.375	.875	.938	1.062													
8	.500	1.000	1.062	1.188	1.312	1.312											
10	.625	1.125	1.188	1.312	1.438	1.438	1.500	1.562	1.562	1.562							
12	.750	1.250	1.312	1.438	1.562	1.562	1.625	1.688	1.688	1.688							
14	.875	1.375	1.438	1.562	1.688	1.688	1.750	1.812	1.812	1.812	2.062						
16	1.000	1.500	1.562	1.688	1.812	1.812	1.875	1.938	2.062	2.188	2.312	2.312					
18	1.125	1.625	1.688	1.812	1.938	1.938	2.000	2.062	2.188	2.312	2.438	2.438	2.625				
20	1.250	1.750	1.812	1.938	2.062	2.062	2.125	2.188	2.312	2.438	2.562	2.562	2.750	2.875			
22	1.375	1.875	1.938	2.062	2.188	2.188	2.250	2.312	2.438	2.562	2.688	2.688	2.875	3.000	3.125		
24	1.500	2.000	2.062	2.188	2.312	2.312	2.375	2.438	2.562	2.688	2.812	2.812	3.000	3.125	3.250	3.375	3.500
26	1.625	2.125	2.188	2.312	2.438	2.438	2.500	2.562	2.688	2.812	2.938	2.938	3.125	3.250	3.375	3.500	3.625
28	1.750	2.250	2.312	2.438	2.562	2.562	2.625	2.688	2.812	2.938	3.062	3.062	3.250	3.375	3.500	3.625	3.750
30	1.875	2.375	2.438	2.562	2.688	2.688	2.750	2.812	2.938	3.062	3.188	3.188	3.375	3.500	3.625	3.750	3.875
32	2.000	2.500	2.562	2.688	2.812	2.812	2.875	2.938	3.062	3.188	3.312	3.312	3.500	3.625	3.750	3.875	4.000
34	2.125	2.625	2.688	2.812	2.938	2.938	3.000	3.062	3.188	3.312	3.438	3.438	3.625	3.750	3.875	4.000	4.125
36	2.250	2.750	2.812	2.938	3.062	3.062	3.125	3.188	3.312	3.438	3.562	3.562	3.750	3.875	4.000	4.125	4.250
38	2.375	2.875	2.938	3.062	3.188	3.188	3.250	3.312	3.438	3.562	3.688	3.688	3.875	4.000	4.125	4.250	4.375
40	2.500	3.000	3.062	3.188	3.312	3.312	3.375	3.438	3.562	3.688	3.812	3.812	4.000	4.125	4.250	4.375	4.500
42	2.625	3.125	3.188	3.312	3.438	3.438	3.500	3.562	3.688	3.812	3.938	3.938	4.125	4.250	4.375	4.500	4.625
44	2.750	3.250	3.312	3.438	3.562	3.562	3.625	3.688	3.812	3.938	4.062	4.062	4.250	4.375	4.500	4.625	4.750
46	2.875	3.375	3.438	3.562	3.688	3.688	3.750	3.812	3.938	4.062	4.188	4.188	4.375	4.500	4.625	4.750	4.875
48	3.000	3.500	3.562	3.688	3.812	3.812	3.875	3.938	4.062	4.188	4.312	4.312	4.500	4.625	4.750	4.875	5.000
50	3.125	3.625	3.688	3.812	3.938	3.938	4.000	4.062	4.188	4.312	4.438	4.438	4.625	4.750	4.875	5.000	5.125
52	3.250	3.750	3.812	3.938	4.062	4.062	4.125	4.188	4.312	4.438	4.562	4.562	4.750	4.875	5.000	5.125	5.250
54	3.375	3.875	3.938	4.062	4.188	4.188	4.250	4.312	4.438	4.562	4.688	4.688	4.875	5.000	5.125	5.250	5.375
56	3.500	4.000	4.062	4.188	4.312	4.312	4.375	4.438	4.562	4.688	4.812	4.812	5.000	5.125	5.250	5.375	5.500
58	3.625	4.125	4.188	4.312	4.438	4.438	4.500	4.562	4.688	4.812	4.938	4.938	5.125	5.250	5.375	5.500	5.625
60	3.750	4.250	4.312	4.438	4.562	4.562	4.625	4.688	4.812	4.938	5.062	5.062	5.250	5.375	5.500	5.625	5.750
62	3.875	4.375	4.438	4.562	4.688	4.688	4.750	4.812	4.938	5.062	5.188	5.188	5.375	5.500	5.625	5.750	5.875
64	4.000	4.500	4.562	4.688	4.812	4.812	4.875	4.938	5.062	5.188	5.312	5.312	5.500	5.625	5.750	5.875	6.000
66	4.125	4.625	4.688	4.812	4.938	4.938	5.000	5.062	5.188	5.312	5.438	5.438	5.625	5.750	5.875	6.000	6.125
68	4.250	4.750	4.812	4.938	5.062	5.062	5.125	5.188	5.312	5.438	5.562	5.562	5.750	5.875	6.000	6.125	6.250
70	4.375	4.875	4.938	5.062	5.188	5.188	5.250	5.312	5.438	5.562	5.688	5.688	5.875	6.000	6.125	6.250	6.375
72	4.500	5.000	5.062	5.188	5.312	5.312	5.375	5.438	5.562	5.688	5.812	5.812	6.000	6.125	6.250	6.375	6.500
74	4.625	5.125	5.188	5.312	5.438	5.438	5.500	5.562	5.688	5.812	5.938	5.938	6.125	6.250	6.375	6.500	6.625
76	4.750	5.250	5.312	5.438	5.562	5.562	5.625	5.688	5.812	5.938	6.062	6.062	6.250	6.375	6.500	6.625	6.750
78	4.875	5.375	5.438	5.562	5.688	5.688	5.750	5.812	5.938	6.062	6.188	6.188	6.375	6.500	6.625	6.750	6.875
80	5.000	5.500	5.562	5.688	5.812	5.812	5.875	5.938	6.062	6.188	6.312	6.312	6.500	6.625	6.750	6.875	7.000
82	5.125	5.625	5.688	5.812	5.938	5.938	6.000	6.062	6.188	6.312	6.438	6.438	6.625	6.750	6.875	7.000	7.125
84	5.250	5.750	5.812	5.938	6.062	6.062	6.125	6.188	6.312	6.438	6.562	6.562	6.750	6.875	7.000	7.125	7.250
86	5.375	5.875	5.938	6.062	6.188	6.188	6.250	6.312	6.438	6.562	6.688	6.688	6.875	7.000	7.125	7.250	7.375
88	5.500	6.000	6.062	6.188	6.312	6.312	6.375	6.438	6.562	6.688	6.812	6.812	7.000	7.125	7.250	7.375	7.500
90	5.625	6.125	6.188	6.312	6.438	6.438	6.500	6.562	6.688	6.812	6.938	6.938	7.125	7.250	7.375	7.500	7.625
92	5.750	6.250	6.312	6.438	6.562	6.562	6.625	6.688	6.812	6.938	7.062	7.062	7.250	7.375	7.500	7.625	7.750
94	5.875	6.375	6.438	6.562	6.688	6.688	6.750	6.812	6.938	7.062	7.188	7.188	7.375	7.500	7.625	7.750	7.875
96	6.000	6.500	6.562	6.688	6.812	6.812	6.875	6.938	7.062	7.188	7.312	7.312	7.500	7.625	7.750	7.875	8.000
98	6.125						7.000	7.062	7.188	7.312	7.438	7.438	7.625	7.750	7.875	8.000	8.125
100	6.250						7.125	7.188	7.312	7.438	7.562	7.562	7.750	7.875	8.000	8.125	8.250
102	6.375						7.250	7.312	7.438	7.562	7.688	7.688	7.875	8.000	8.125	8.250	8.375
104	6.500						7.375	7.438	7.562	7.688	7.812	7.812	8.000	8.125	8.250	8.375	8.500
106	6.625						7.500	7.562	7.688	7.812	7.938	7.938	8.125	8.250	8.375	8.500	8.625
108	6.750						7.625	7.688	7.812	7.938	8.062	8.062	8.250	8.375	8.500	8.625	8.750
110	6.875						7.750	7.812	7.938	8.062	8.188	8.188	8.375	8.500	8.625	8.750	8.875
112	7.000						7.875	7.938	8.062	8.188	8.312	8.312	8.500	8.625	8.750	8.875	9.000
114	7.125												8.625	8.750	8.875	9.000	9.125
116	7.250												8.750	8.875	9.000	9.125	9.250
118	7.375												8.875	9.000	9.125	9.250	9.375
120	7.500												9.000	9.125	9.250	9.375	9.500
122	7.625												9.125	9.250	9.375	9.500	9.625
124	7.750												9.250	9.375	9.500	9.625	9.750
126	7.875												9.375	9.500	9.625	9.750	9.875
128	8.000												9.500	9.625	9.750	9.875	

(E) *APPLIES TO MS20012A ONLY.

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

PREPARING ACTIVITY NAVY - AS
CUSTODIANS ARMY-AP NAVY-
AIR FORCE--99 DLA-
REVIEW ARMY - EP, ME, MJ DLA - IS AF-R
USER APPY - AV
PROJECT NUMBER 530E-123E

MILITARY SPECIFICATION SHEET
TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU
AND 9E KSI FSL

SPECIFICATION SHEET NUMBER 30 MAY 1969
MS20004E THRU 20024E
SUPERSEDING
MS20004D THRU 20024D 1C AUGUST 1981
AMSC- N/A FSC 5306

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Page 1 of 4

UNASSIGNED DASH NUMBERS SHALL NOT BE USED, EXCEPT THOSE DASH NUMBERS COVERED BY THE FOLLOWING CODING NOTE

DASH NUMBERS INDICATE PREFERRED GRIP LENGTHS IN 125 INCREMENTS. INTERMEDIATE GRIP LENGTHS BETWEEN THOSE LENGTHS LISTED, MAY BE SPECIFIED IN .062 INCREMENTS BY INTERMEDIATE DASH NUMBERS. LENGTH AND GRIP OF A BOLT WITH AN ODD NUMBER FOR THE DASH NUMBER WILL BE .062 GREATER THAN SHOWN FOR THE BOLTS WITH THE PRECEDING EVEN DASH NUMBER. ONLY BOLT DIAMETER FOR WHICH THERE ARE QUALIFIED PRODUCTS LISTED ON QPL-7838 SHALL BE USED FOR DESIGN.

FOR EACH BOLT DIAMETER GRIP LENGTHS GREATER OR LESS THAN THOSE DESIGNATED BY ASSIGNED DASH NUMBERS ON TABLE II ARE INACTIVE FOR DESIGN.

ADD "H" BEFORE DASH NUMBER FOR BOLT WITH DRILLED HEAD

EXAMPLES OF PART NUMBERS MS20017-18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, UNDRILLED HEAD
MS20017H18 = 1-12 BOLT, 2.438 INCH LONG, 1.125 INCH GRIP, DRILLED HEAD.

THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODSS SPECIFIED IN THE SOLICITATION MIL-B-7838

THIS SPECIFICATION IS APPROVED FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY - AR NAVY - AIR FORCE - 99 DLA - REVIEW ARMY - ER, ME, MI DLA - JS AF - B2 USER ARMY - AV PROJECT NUMBER 530E-123F	MILITARY SPECIFICATION SHEET TITLE BOLT - INTERNAL WRENCHING, 160 KS; FTU AND 96 KS; FSL	SPECIFICATION SHEET NUMBER 30 MAY 1989 MS20004E THRU 20024E SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1981 AMSC - N/A FSC 5306
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