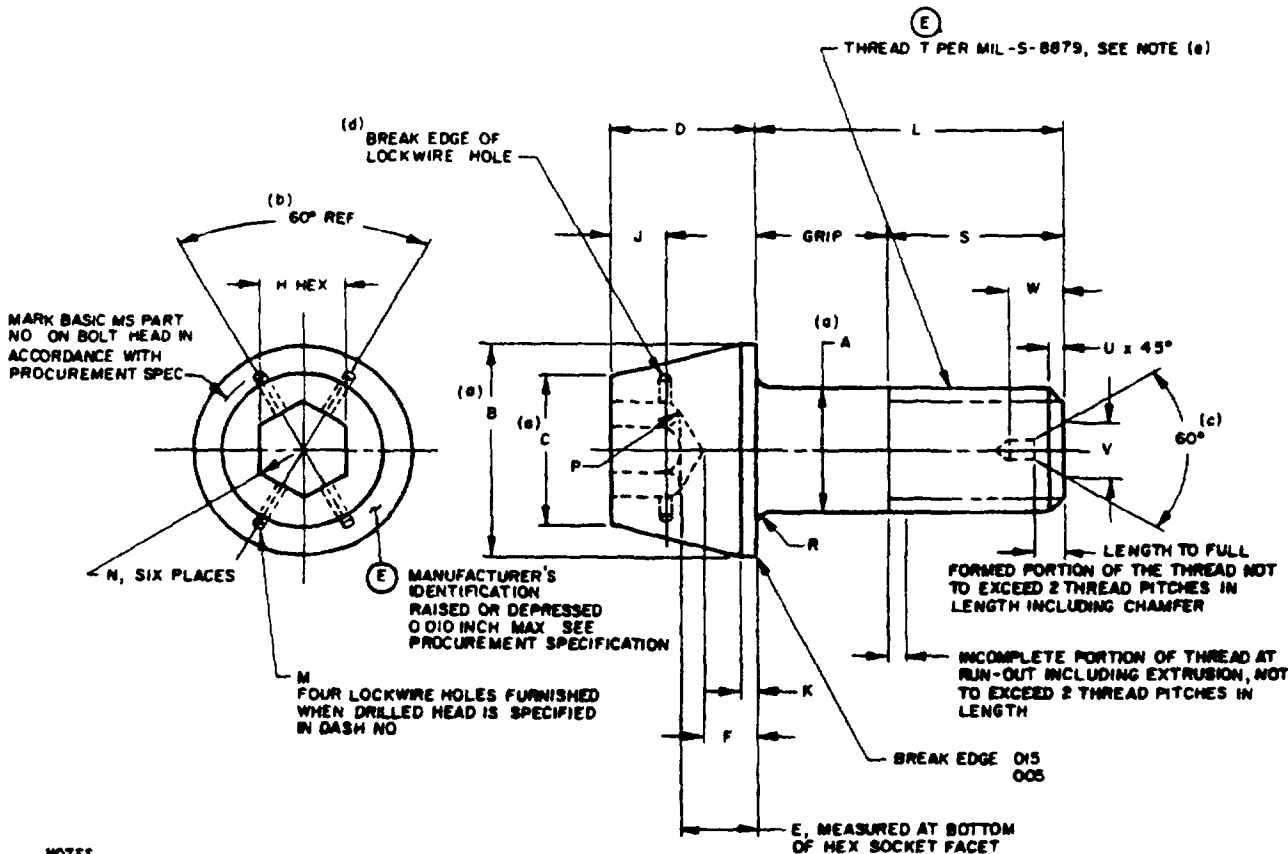


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DODISS SPECIFIED IN THE SOLICITATION MIL-B-7838



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), 1-14MS-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-	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 95 KSI FSL	SPECIFICATION SHEET NUMBER 30 MAY 1969 MS20004E THRU 20024E SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1961 AMSC- N/A FSC 5306
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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			

TABLE I (CONTINUED)

(E) SEE NOTE (f)

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	Y	Z
	MS20004									.475	.031		
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			1.037	.062			43,600	.012	.016				
MS20012			1.162		187	200	63,200	.015	.018				
MS20014			1.287	.078			86,100	.018	.022				
MS20016			1.475		250	260	112,000	.020	.025				
MS20017			1.600				114,000	.022	.026				
MS20018			1.725	.094			144,000	.025	.032				
MS20020			1.850		.312	320	180,000	.028	.035				
MS20022			2.073	.130			219,000	.030	.039				
MS20024			2.200	.162			263,000	.035	.048				
MS20024			2.325	.194			317,000	.040	.055				

(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 20024E 10 AUGUST 1981
AMSC- N/A FSC 5306

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Page 2 of 4

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								
12	.750	1.250	1.312	1.438	1.562	1.562	1.625	1.688	1.688	1.812							
14	.875	1.375	1.438	1.562	1.688	1.688	1.750	1.812	1.812	1.938	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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	
98	6.125						7.000	7.062	7.188	7.312	7.438	7.438	7.625	7.750	7.875	8.000	
100	6.250						7.125	7.188	7.312	7.438	7.562	7.562	7.750	7.875	8.000	8.125	
102	6.375						7.250	7.312	7.438	7.562	7.688	7.688	7.875	8.000	8.125	8.250	
104	6.500						7.375	7.438	7.562	7.688	7.812	7.812	8.000	8.125	8.250	8.375	
106	6.625						7.500	7.562	7.688	7.812	7.938	7.938	8.125	8.250	8.375	8.500	
108	6.750						7.625	7.688	7.812	7.938	8.062	8.062	8.250	8.375	8.500	8.625	
110	6.875						7.750	7.812	7.938	8.062	8.188	8.188	8.375	8.500	8.625	8.750	
112	7.000						7.875	7.938	8.062	8.188	8.312	8.312	8.500	8.625	8.750	8.875	
114	7.125												8.625	8.750	8.875	9.000	
116	7.250												8.750	8.875	9.000	9.125	
118	7.375												8.875	9.000	9.125	9.250	
120	7.500												9.000	9.125	9.250	9.375	
122	7.625												9.125	9.250	9.375	9.500	
124	7.750												9.250	9.375	9.500	9.625	
126	7.875												9.375	9.500	9.625	9.750	
128	8.000												9.500	9.625	9.750	9.875	

(E) *APPLIES TO MS20012A ONLY.

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 DDSSS 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-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 3 of 4

Form approved
OMB No 0704-0188

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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Page 1 of 1