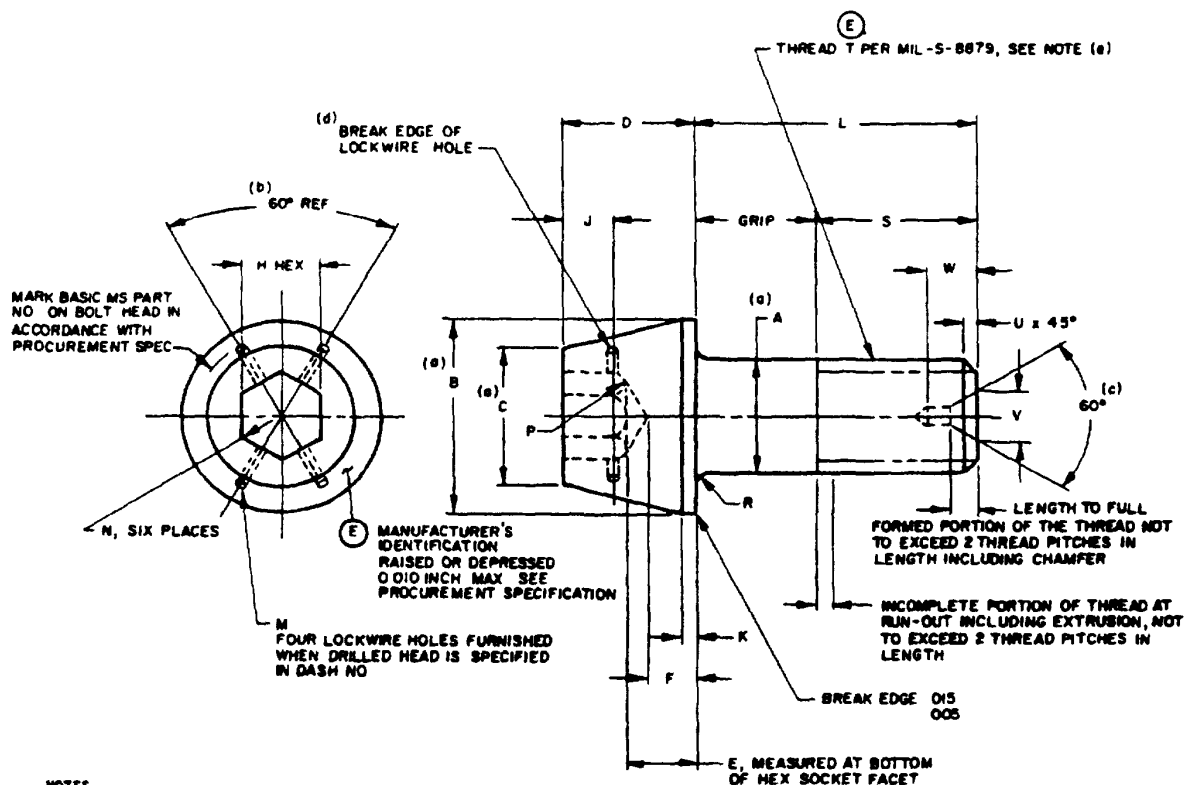


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DOORS SPECIFIED IN THE SOLICITATION MIL-B-7838



#### 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 1), 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 - 0.10, ANGLES ±1°
- (5) DIMENSIONS TO BE MET AFTER PLATING INTERCHANGEABILITY RELATIONSHIP
- 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

PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY-AR NAVY- AIR FORCE-99 DLA- REVIEW ARMY - ER, ME, MI DLA - IS AF-R? USER ARMY - AV PROJECT NUMBER 5306-123E	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 50 KSI FSL	SPECIFICATION SHEET NUMBER 30 MAY 1989 <b>MS20004E THRU 20024E</b> SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1981 AMSC- N/A FSC 5306
DISTRIBUTION STATEMENT A Approved for public release distribution is unlimited		Page 1 of 4

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

Form approved  
OMB No 0704-0188

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

(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	.342	.250	.112	.068	.1900	.1880	.078		.037	.010
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			.011
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			.019
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											.391			
MS20017	1-12 UNJF-3A	.9985	.9955	1.625	1.615	1.249	1.000	.527	.381	.7547	.7507	.453			.022
MS20018	1-1/8-12 UNJF-3A	1.124	1.121	1.875	1.865	1.275	1.125	.589	.443			.500			
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	.547	.125		
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	.594	.156		
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	.694	.184		
MS20012A	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	.5660	.5630	.281			

(E) SEE NOTE (f)

TABLE I (CONTINUED)

BASIC MS PART NO	P RAD		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			.041	.031	.475	.031				6,190	.005	.007	
MS20005					.537					9,820	.006	.008	0045
MS20006					.662	.047				15,200	.008	.010	
MS20007	020	010			.787					20,400	.009	.011	
MS20008			.057	.047						27,400	.010	.012	
MS20009					.850					34,800	.011	.014	.006
MS20010					.912	.062				43,600	.012	.016	
MS20012					1.037		187	200	2	63,200	.015	.018	
MS20014					1.162					86,100	.018	.022	
MS20016 *			.073	.063	1.287	.078				112,000	.020	.025	.009
MS20017					1.475		250	260	3	144,000	.022	.026	
MS20018	030	015			1.600					180,000	.025	.032	
MS20020			.089	.077	1.725	.094	.312	320	4	219,000	.028	.035	
MS20022					1.850					263,000	.030	.039	.012
MS20024					1.930	.062	187	200	2	323,200	.035	.040	.006
MS20012A			.073	.063	1.287	.078				112,000	.020	.025	.009

(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 -  
REVIEW ARMY - EP, ME, MI DLA - IS AF - HC  
USER ARMY - AV  
PROJECT NUMBER 5306-1233

MILITARY SPECIFICATION SHEET  
TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU  
AND 96 KSI FSL

SPECIFICATION SHEET NUMBER 30 MAY 1989  
MS20004E THRU 20024E  
SUPERSEDING  
MS20004D THRU 20024D 10 AUGUST 1981  
AMSC - N/A FSC 5306

DISTRIBUTION STATEMENT A Approved for public release, distribution is unlimited

Page 2 of 4

DD FORM 672 MAY 1988

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

14 2004

**TABLE 11 DASH NOS , GRIP LENGTHS AND BOLT LENGTH**

DASH NO	GRIP = 010	LENGTH = 015															
		MS20004 1/4	MS20005 5/16	MS20006 3/8	MS20007 7/16	MS20008 1/2	MS20009 9/16	MS20010 5/8	MS20012 3/4	MS20014 7/8	MS20016 1	MS20017 1	MS20018 1-1/8	MS20020 1-1/4	MS20022 1-3/8	MS20024 1-1/2	
4	250	.750															
6	375	.875															
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	1.688	1.812							
12	750	1.250	1.312	1.438	1.562	1.562	1.625	1.688	1.812	1.938							
14	875	1.375	1.438	1.562	1.688	1.688	1.750	1.812	1.938	2.062							
16	1000	1.500	1.562	1.688	1.812	1.812	1.875	1.938	2.062	2.188	2.312	2.312					
18	1125	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	1250	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	1375	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	1500	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	1625	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	1750	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	1875	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	2000	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	2125	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	2250	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	2375	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	2500	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	2625	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	2750	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	2875	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	3000	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	3125	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	3250	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	3375	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	3500	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	3625	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	3750	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	3875	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	4000	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	4125	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	4250	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	4375	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	4500	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	4625	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	4750	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	4875	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	5000	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	5125	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	5250	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	5375	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	5500	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	5625	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	5750	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	5875	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	6000	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	6125						7.000	7.062	7.188	7.312	7.438	7.438	7.625	7.750	7.875	8.000	
100	6250						7.125	7.188	7.312	7.438	7.562	7.562	7.750	7.875	8.000	8.125	
102	6375						7.250	7.312	7.438	7.562	7.688	7.688	7.875	8.000	8.125	8.250	
104	6500						7.375	7.438	7.562	7.688	7.812	7.812	8.000	8.125	8.250	8.375	
106	6625						7.500	7.562	7.688	7.812	7.938	7.938	8.125	8.250	8.375	8.500	
108	6750						7.625	7.688	7.812	7.938	8.062	8.062	8.250	8.375	8.500	8.625	
110	6875						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.

PREPARING ACTIVITY NAVY - AS

CUSTODIANS ARMY-AP NAVY-

AIR FORCE-99                      DLA-

REVIEW ARMY - EP, ME, MI DLA - IS AF-8?

USER ARMY - AV

PROJECT NUMBER 5306-123E

MILITARY SPECIFICATION SHEET

TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU  
AND 96 KSI FSL

SPECIFICATION SHEET NUMBER 30 MAY 1989

MS20004E THRU 20024E

**SUPERSEDING**

MS20004D THRU 20024D 10 AUGUST 1981

AMSC-	N/A
-------	-----

FSC 5306

**DISTRIBUTION STATEMENT A** Approved for public release distribution is unlimited

Page 3 of 4

DD FORM 672 MAY 1988

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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 DODDS SPECIFIED IN THE SOLICITATION MIL - 8 - 7838

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

**ADDITIONAL PAGE INFORMATION**

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 DODDS SPECIFIED IN THE SOLICITATION MIL-B-7838

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

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.

PREPARING ACTIVITY NAVY - AS  
CUSTODIANS ARMY - AR NAVY -  
AIR FORCE - 99 DLA -  
REVIEW ARMY - ER, ME, MI DLA - JS AF - 62  
USER ARMY - AV  
PROJECT NUMBER 5306-1234

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

AWSC- N/A FSC 5306

DISTRIBUTION STATEMENT A Approved for public release distribution is unlimited

Page 1 of 1

DD FORM 672 MAY 1988

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

14 0004