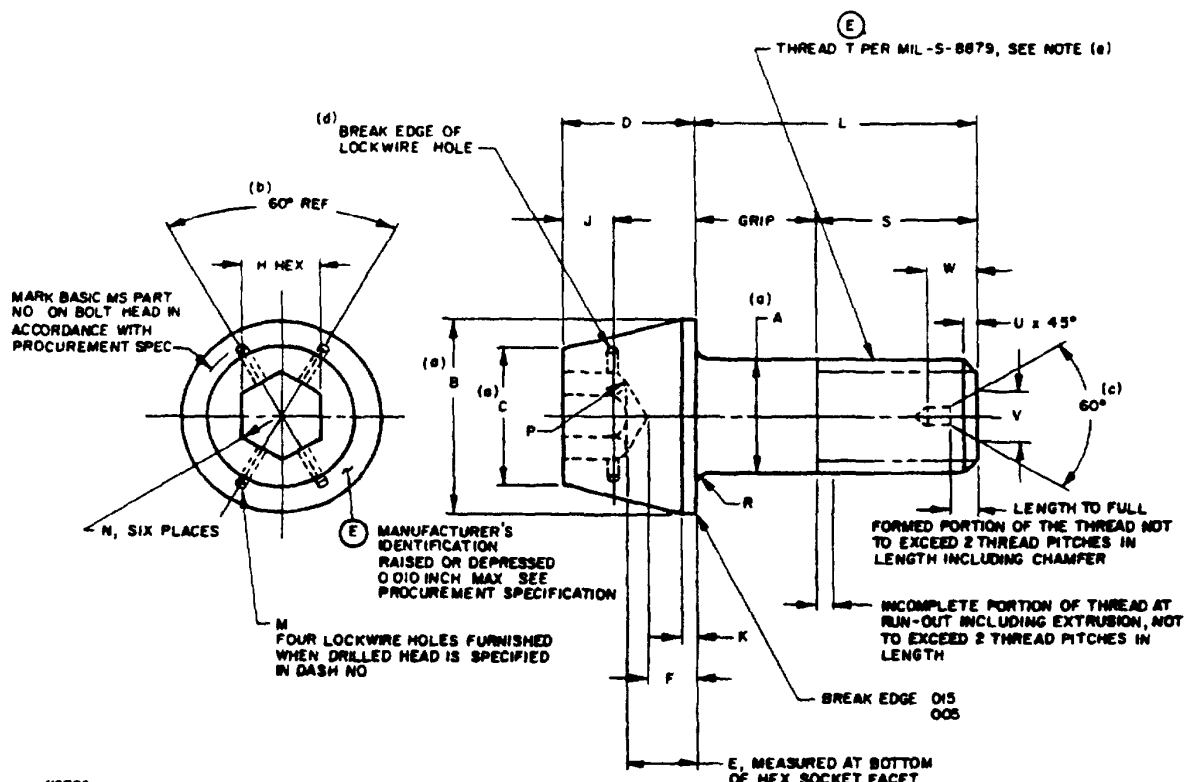


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DOORS SPECIFIED IN THE SOLICITATION MIL-B-7836



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-7836
- (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 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 1 of 4

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(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			
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			
MS20012A	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	.5660	.5630	.281			.094

(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	020	010	.041	.031	.475	.031				6,190	.005	.007	0045		
MS20005					.537				9,820	.006	.008				
MS20006					.662		.047		15,200	.008	.010				
MS20007					.787				20,400	.009	.011				
MS20008									27,400	.010	.012				
MS20009					.850				34,800	.011	.014				
MS20010					.912			.062		43,600	.012	.016			
MS20012					1.037					63,200	.015	.018			
MS20014	030	015	.073	.063	1.162	.078	187	200	2	86,100	.018	.022	.009		
MS20016 *					1.287					112,000	.020	.025			
MS20017							250	260	3	144,000	.022	.026			
MS20018					1.475					180,000	.025	.032			
MS20020							.312	320	4	219,000	.028	.035		.012	
MS20022					.089					.077	263,000	.030			.039
MS20024											323,200	.035			.040
MS20012A								.073	.063	1.287	.062	187		200	2

(E) SEE NOTE (f)

* SEE NOTE (a)

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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

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DD FORM 672 MAY 1988

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TABLE 11 DASH NOS , GRIP LENGTHS AND BOLT LENGTH

		LENGTH = 015														
DASH NO	GRIP = 010	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

⑤ • 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?

REVIEW AMY - ST
USER APMY - 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
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FSC 5306

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ADDITIONAL PAGE INFORMATION

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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

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DD FORM 672 MAY 1988

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