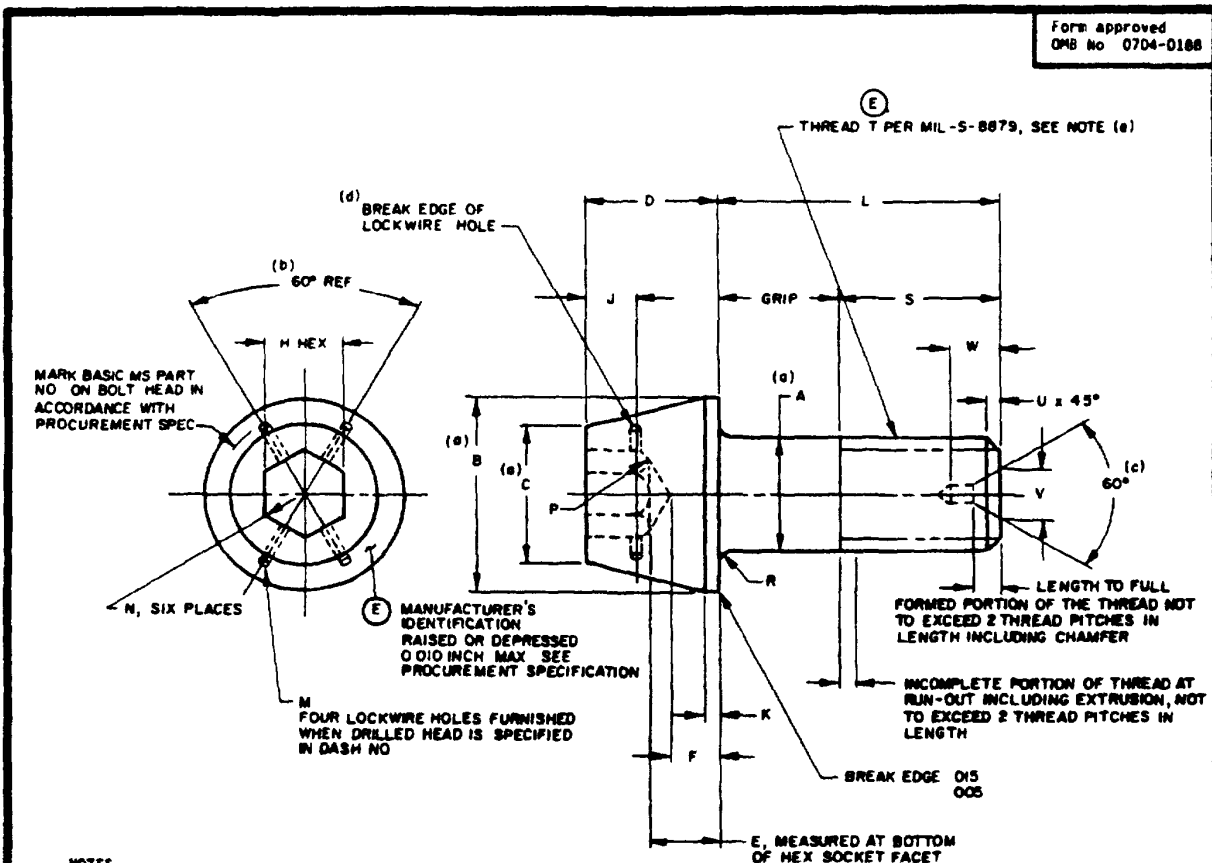


THE REQUIREMENTS FOR ACQUIRING THE PRODUCT(S) DESCRIBED HEREIN SHALL CONSIST OF THIS SPECIFICATION SHEET AND THE ISSUE OF THE FOLLOWING SPECIFICATION LISTED IN THAT ISSUE OF THE DOORS SPECIFIED IN THE SOLICITATION MIL-B-7836



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), 1-14NS-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 - 010, 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, PE, MI DLA - IS AF-82 USER ARMY - AV PROJECT NUMBER 5306-123E	MILITARY SPECIFICATION SHEET TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 90 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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(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			.010
MS20005	5/16-24 UNJF-3A	.3117	.3102	.531	.521	.394	.312	.144	.094	2.210	2.190	.094			.011
MS20006	3/8-24 UNJF-3A	.3742	.3727	.649	.639	.520	.375	.183	.116	3.150	3.130	.125			.019
MS20007	7/16-20 UNJF-3A	.4367	.4347	.750	.740	.534	.438	.208	.147	3.785	3.755	.172			.022
MS20008	1/2-20 UNJF-3A	.4991	.4971	.828	.818	.625	.500	.247	.169	4.410	4.380	.203			.022
MS20009	9/16-18 UNJF-3A	.5616	.5596	.938	.928	.723	.562	.279	.190	5.035	5.005	.234			.022
MS20010	5/8-18 UNJF-3A	.6240	.6220	1.050	1.040	.826	.625	.317	.216	5.660	5.630	.281			.022
MS20012	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	6.295	6.257	.344			.022
MS20014	7/8-14 UNJF-3A	.8737	.8707	1.438	1.428	1.083	.875	.450	.327	7.547	7.507	.391			.022
MS20016 *	1-14 NS-3A		.9955	1.625	1.615	1.249	1.000	.527	.381			.453			.022
MS20017	1-12 UNJF-3A	9985		1.625	1.615	1.249	1.000	.527	.381	7.547	7.507	.391			.022
MS20018	1-1/8-12 UNJF-3A	1.124	1.121	1.875	1.865	1.275	1.125	.589	.443			.453			.022
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	.125		.022
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			.022
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	.156		.022
MS20012A	3/4-16 UNJF-3A	.7488	.7468	1.230	1.220	.921	.750	.385	.273	6.295	6.257	.344			.022

(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	.850					27,400	.010	.012	
MS20009					.912	062				34,900	.011	.014	.006
MS20010					1.037					43,600	.012	.016	
MS20012					1.162		187	200	2	63,200	.015	.018	
MS20014					1.287	078				86,100	.018	.022	
MS20016 *			073	063	1.475		250	260	3	112,000	.020	.025	.009
MS20017	030	015			1.600					114,000	.022	.026	
MS20018					1.725	094				144,000	.025	.032	
MS20020			.089	.077	1.850		.312	320	4	180,000	.028	.035	.012
MS20022					2.000					219,000	.030	.039	
MS20024					2.150					263,000	.030	.039	
MS20012A			.073	.063	0.730	062	187	200	2	63,200	.015	.018	.006

(E) SEE NOTE (f)

* SEE NOTE (a)

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PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY - AP NAVY -	MILITARY SPECIFICATION SHEET	SPECIFICATION SHEET NUMBER 30 MAY 1989
AIR FORCE - 99 DLA - ARMY - EP, ME, MI DLA - IS AF - HC	TITLE BOLTS, INTERNAL WRENCHING, 160 KSI FTU AND 96 KSI FSL	MS20004E THRU 20024E
REVIEW USER ARMY - AV		SUPERSEDING MS20004D THRU 20024D 10 AUGUST 1981
PROJECT NUMBER 5306-1233		AMSC - N/A FSC 5306

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TABLE II DASH NOS., GRIP LENGTHS AND BOLT LENGTH

DASH NO	GRIP = 010	LENGTH = D15															
		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	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	1.812	1.812						
12	750	1.250	1.312	1 438	1.562	1 562	1 625	1.688	1 812	1 812	1 938						
14	.875	1.375	1 438	1 562	1 688	1 688	1 750	1 812	1 938	2 062	2 062						
16	1 000	1 500	1.562	1 688	1 812	1 812	1.875	1 938	2 062	2 188	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	2 312	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	2 438	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	2 562	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	2.688	2 812	2 812	3 000	3 125	3 250	
26	1.625	2 125	2 188	2 312	2 438	2 438	2 500	2.562	2 688	2 812	2 812	2 938	2 938	3 125	3 250	3 375	
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	3 188	3 250	3 375	3 500	
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	3 312	3 375	3 500	3 625	
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	3 438	3 500	3 625	3 750	
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	3 562	3 625	3 750	3 875	
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	3 688	3 750	3 875	4 000	
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	3 812	3 875	4 000	4 125	
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.

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PREPARING ACTIVITY NAVY - AS CUSTODIANS ARMY-AP NAVY- AIR FORCE-99 DLA- REVIEW ARMY - EP, ME, MI 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 SUPERSEEDING MS20004D THRU 20024D 1C AUGUST 1961 AMSC- N/A FSC 5306
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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.

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

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PREPARING ACTIVITY NAVY - AS
CUSTODIANS ARMY - AR NAVY -
AIR FORCE - 99 DLA -
REVIEW ARMY - ER, ME, MI DLA - 15 AF - 62
USER ARMY - AV
PROJECT NUMBER 5306-12 14

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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