

USER ACTIVITIES:  
ME MU PA CL WV OB MC NSA

REVIEWER ACTIVITIES:  
AT AV MI EA

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This military standard is approved for use by all Departments and Agencies of the Department of Defense.  
No action for all new engineering and design applications and for repetitive use shall be made from this document when applicable.

NOMINAL SIZE			1/4	5/16	3/8	7/16	1/2	9/16	5/8
B	THREAD	UNF-2A	28	24	24	20	20	18	18
D	BODY DIAMETER	MAX MIN	.2500 .2450	.3125 .3065	.3750 .3690	.4375 .4305	.5000 .4930	.5625 .5545	.6250 .6170
F	WIDTH ACROSS FLATS	MAX MIN	.4375 .4280	.5000 .4890	.5625 .5510	.6250 .6120	.7500 .7360	.8125 .7980	.9375 .9220
C	WIDTH ACROSS CORNERS	MAX MIN	.505 .486	.577 .557	.650 .628	.722 .698	.866 .840	.938 .910	1.083 1.051
H	HEAD HEIGHT	MAX MIN	.163 .150	.211 .195	.243 .226	.291 .272	.323 .302	.371 .348	.403 .378
R	RADIUS	MAX MIN	.025 .015	.025 .015	.025 .015	.025 .015	.025 .015	.045 .020	.045 .020
* MIN TENSILE STRENGTH - LBS			6,450	8,700	13,200	17,800	24,000	30,400	38,400

L LENGTH	TOLERANCE	DASH NO.	DASH NO.	DASH NO.	DASH** NO.	DASH NO.	DASH** NO.	DASH NO.			
.375	+0 -.031	1	27	53	79	104	130	155			
.438		2	28	54					80	106	131
.500		3	29	55					81	107	132
.562		4	30	56					82	108	133
.625		5	31	57					83	109	134
.750		6	32	58					84	110	135
.875		7	33	59					85	111	136
1.000		8	34	60					86	112	137
1.125	+0 -.062	9	35	61	88	113	138	161			
1.250		10	36	62					89	114	139
1.375		11	37	63					90	115	140
1.500		12	38	64					91	116	141
1.750		13	39	65					92	117	142
2.000		14	40	66					93	118	143
2.250		15	41	67					94	119	144
2.500	+0 -.094	16	42	68	95	120	145	166			
2.750		17	43	69					96	121	146
3.000		18	44	70					97	122	147
3.250		19	45	71					98	123	148
3.500		20	46	72					99	124	149
3.750		21	47	73					100	125	150
4.000		22	48	74					101	126	151
4.250		23	49	75					102	127	152
4.500		24	50	76					103	128	153
4.750		25	51	77					104	129	154
5.000		26	52	78					105	129	154
5.500											
6.000											

NOTE: FOR NOTES AND ADDITIONAL SIZES SEE SHEET 2

CROSS REFERENCE OF PART NUMBERS

THE SCREWS COVERED BY DASH NUMBERS GIVEN IN MS35302, MS35304 AND MS35306 ARE CANCELLED AFTER THE DATES INDICATED ON THE CANCELLED DOCUMENTS. USE DASH NUMBERS USED IN THIS STANDARD. THE CANCELLED SCREWS CANNOT ALWAYS REPLACE THE NEW SCREWS AND SHOULD BE USED UNTIL EXISTING STOCKS ARE DEPLETED. USE ONLY THE NEW SCREWS FOR DESIGN AND REPLACEMENT. DASH NUMBERS REPRESENTING OLD AND NEW SCREWS ARE IDENTICAL, MAKING IT UNNECESSARY TO PREPARE AN INTERCHANGEABILITY TABLE.

(F) DENOTES CHANGES

PA	AR	INTERNATIONAL INTEREST	TITLE
Other Call	99		SCREW, CAP, HEXAGON HEAD (FINISHED HEXAGON BOLT), ALLOY STEEL, GRADE 8, ZINC COATED, UNF 2A, PLAIN AND SELF LOCKING (F)
PRELIMINARY SPECIFICATION	FF-S-85	SUPERSEDES	SEE NOTE 12

**MILITARY STANDARD**  
**MS90727**

SHEET 5

TABLE 11

NOMINAL SIZE			3/4	7/8	1	1-1/8	1-1/4	1-3/8	1-1/2
B	THREAD	UNF-2A	16	14	12	12	12	12	12
D	BODY DIAMETER	MAX MIN	.7500 .7410	.8750 .8660	1.0000 .9900	1.1250 1.1140	1.2500 1.2390	1.3750 1.3630	1.5000 1.4880
F	WIDTH ACROSS FLATS	MAX MIN	1.1250 1.1000	1.3125 1.2850	1.5000 1.4690	1.6875 1.6310	1.8750 1.8120	2.0625 1.9940	2.2500 2.1750
G	WIDTH ACROSS CORNERS	MAX MIN	1.299 1.254	1.516 1.465	1.732 1.675	1.949 1.859	2.165 2.066	2.382 2.273	2.598 2.480
H	HEAD HEIGHT	MAX MIN	.483 .455	.563 .531	.627 .591	.718 .658	.813 .749	.878 .810	.974 .902
R	RADIUS	MAX MIN	.045 .020	.065 .040	.095 .060	.095 .060	.095 .060	.095 .060	.095 .060
* MIN TENSILE STRENGTH - LBS			56,000	70,400	99,400	128,400	161,000	197,200	237,200

L LENGTH	TOLERANCE		DASH NO.	DASH** NO.	DASH NO.	DASH NO.	DASH NO.	DASH NO.	DASH NO.
	SIZE .750	SIZE .875 AND OVER							
.750			179						
.875	+0	+0	180	202					
1.000	-.031	-.062	181	201	224				
1.125			182	204	225	245			
1.250	+0	+0	183	205	226	246	265		
1.375	-.062	-.125	184	206	227	247	266	284	
1.500			185	207	228	248	267	285	302
1.750			186	208	229	249	268	286	303
2.000			187	209	230	250	269	287	304
2.250			188	210	231	251	270	288	305
2.500			189	211	232	252	271	289	306
2.750			190	212	233	253	272	290	307
3.000			191	213	234	254	273	291	308
3.250			192	214	235	255	274	292	309
3.500			193	215	236	256	275	293	310
3.750	+0	+0	194	216	237	257	276	294	311
4.000	-.094	-.188	195	217	238	258	277	295	312
4.250			196	218	239	259	278	296	313
4.500			197	219	240	260	279	297	314
4.750			198	220	241	261	280	298	315
5.000			199	221	242	262	281	299	316
5.500			200	222	243	263	282	300	317
6.000			201	223	244	264	283	301	318

NOTES:

- MATERIAL: ALLOY STEEL, GRADE 8, IN ACCORDANCE WITH PROCUREMENT SPECIFICATION.
- F** PROTECTIVE COATING: ZINC COATING IN ACCORDANCE WITH PROCUREMENT SPECIFICATION.
- THREADS: THE THREADS SHALL BE IN ACCORDANCE WITH SCREW-THREAD STANDARDS FOR FEDERAL SERVICES, HANDBOOK H28.
- THREAD LENGTH: MINIMUM THREAD LENGTH SHALL BE TWICE THE DIAMETER PLUS 1/4 INCH. THE TOLERANCE SHALL BE PLUS 3/16 INCH OR 2-1/2 THREADS, WHICHEVER IS GREATER. ON SCREWS THAT ARE TOO SHORT FOR MINIMUM THREAD LENGTHS, THE DISTANCE FROM THE BEARING SURFACE OF THE HEAD TO THE FIRST COMPLETE THREAD SHALL NOT EXCEED THE LENGTH OF 1-1/2 THREADS FOR SIZES UP TO AND INCLUDING 1 INCH AND 3-1/2 THREADS FOR SIZES LARGER THAN 1 INCH.
- DIMENSIONS: ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE SPECIFIED.
- HEAD MARKING: HEADS SHALL BE MARKED IN ACCORDANCE WITH MIL-HDBK-111. RAISED MARKINGS ARE PREFERRED, STAMPINGS ARE ACCEPTABLE.

PA INTERNATIONAL TITLE  
AR INTEREST  
99

SCREW, CAP, HEXAGON HEAD (FINISHED HEXAGON BOLT), ALLOY STEEL, GRADE 8, ZINC COATED, UNF-2A, PLAIN AND SELF-LOCKING **F**

PROCUREMENT SPECIFICATION SUPERSEDED BY  
FF-S-85 SEE NOTE 12

**MILITARY STANDARD**  
**MS90727**

SHEET 2 OF 5

5305-1747

USER ACTIVITIES  
ME MU PA CL WV OB MC NSA

REVIEWER ACTIVITIES  
AT AV MI EA

This military standard is approved for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document when applicable.

APPROVED 6 MAY 63 REVISED (A) 1 AUG 67 (B) 14 OCT 68 (C) 1 MAY 1969 (D) 22 OCT 1970 (E) FOR CHANGES SEE SHEETS 1, 2, 3, 4, AND 5

USER ACTIVITIES  
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- 7. SELF-LOCKING ELEMENT:
  - (a) THE SELF-LOCKING ELEMENT SHALL BE A FANCI TYPE OR LONGITUDINAL SPLIT IN ACCORDANCE WITH MIL-F-18240.
  - (b) FOR "X" AND "Y" DIMENSIONS AND DESIGN AND USAGE LIMITATIONS, SEE MS19981.
  - (c) MAXIMUM RING GAGE DIAMETER THAT LOCKING REGION OF SCREW MUST PASS THRU FREELY OR WITH FINGER PRESSURE SHALL BE THE NOMINAL SIZE PLUS 0.010.
- 8. PART NUMBER: THE MS PART NUMBER CONSISTS OF THE MS NUMBER, PLUS THE DASH NUMBER. FOR SCREWS WITH SELF-LOCKING ELEMENT ADD THE LETTER "L" AFTER THE DASH NUMBER.
 

EXAMPLE: MS90727-1 PLAIN SCREW  
MS90727-1L SELF-LOCKING SCREW.
- \*9. BASED ON MINIMUM ULTIMATE TENSILE STRENGTH OF 150,000 P.S.I., TENSILE STRENGTHS ARE CALCULATED BY THE STRESS AREAS INDICATED IN SCREW-THREAD STANDARDS FOR FEDERAL SERVICES, HANDBOOK H28.
- 10. REFERENCED DOCUMENTS SHALL BE OF THE ISSUE IN EFFECT ON DATE OF INVITATIONS FOR BID.
- 11. FOR DESIGN FEATURE PURPOSES, THIS STANDARD TAKES PRECEDENCE OVER PROCUREMENT DOCUMENTS REFERENCED HEREIN.
- 12. SUPERSEDES: MS35307 IN PART, MS35304 AND MS35306, SCREW, BOLT IN PART, BOLX4, SUBX17, 17.1, 18, 18.1, 19 AND 19.1.
- \*13. INACTIVE FOR NEW DESIGN AFTER 21 JUNE 1976.
- (F) 14. THIS MILITARY STANDARD IS NOT INTENDED FOR USE IN AIRBORNE APPLICATIONS.

APPROVED 6 MAY 63 REVISED (A) 1 AUG 67 (B) 14 OCT 68 (C) 1 MAY 1969 (D) 29 OCT 1970 (E) 13 APR 1973 (F) 13 APR 1973 (G) 13 APR 1973 (H) 13 APR 1973 (I) 13 APR 1973 (J) 13 APR 1973 (K) 13 APR 1973 (L) 13 APR 1973 (M) 13 APR 1973 (N) 13 APR 1973 (O) 13 APR 1973 (P) 13 APR 1973 (Q) 13 APR 1973 (R) 13 APR 1973 (S) 13 APR 1973 (T) 13 APR 1973 (U) 13 APR 1973 (V) 13 APR 1973 (W) 13 APR 1973 (X) 13 APR 1973 (Y) 13 APR 1973 (Z) 13 APR 1973

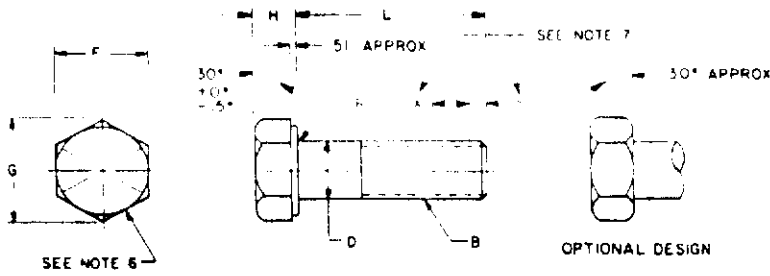
PA	AR	INTERNATIONAL INTEREST	FILE	SCREW, CAP, HEXAGON HEAD (FINISHED HEXAGON BOLT), ALLOY STEEL, GRADE 8, ZINC COATED, UNF-2A, PLAIN AND SELF-LOCKING (F)	<b>MILITARY STANDARD</b>
Other Cost	99				<b>MS90727</b>
PROCUREMENT SPECIFICATION	FF-S-85	SUPERSEDES	SEE NOTE 12	SHEET	OF
				3	5

USE ALL DIMENSIONS  
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DD FORM 1



FEED STOCK CLASS  
5305

TABLE 1  
METRIC TRANSFORMATION OF TABLE 1

NOMINAL SIZE	MM	6.350	7.938	9.525	11.112	12.700	14.288	15.875
B THREAD PITCH		0.937	1.056	1.056	1.270	1.270	1.411	1.411
D BODY DIAMETER	MAX MIN	6.350 6.223	7.938 7.785	9.525 9.373	11.112 10.935	12.700 12.522	14.288 14.084	15.875 15.672
F WIDTH ACROSS FLATS	MAX MIN	11.112 10.871	12.700 12.427	14.288 13.995	15.875 15.547	19.050 18.694	20.638 20.269	23.812 23.419
G WIDTH ACROSS CORNERS	MAX MIN	12.627 12.395	14.056 13.748	15.525 15.195	17.039 16.729	18.596 18.236	20.255 19.854	22.008 21.595
H HEAD HEIGHT	MAX MIN	4.140 3.810	5.359 4.953	6.172 5.740	7.391 6.909	8.204 7.671	9.423 8.839	10.236 9.601
R RADIUS	MAX MIN	.635 .381	.635 .381	.635 .381	.635 .381	.635 .381	1.143 .508	1.143 .508
* MIN TENSILE STRENGTH-KN		24.525	39.150	59.400	80.100	108.000	136.800	172.800
L LENGTH	TOLERANCE	DASH NO.	UNIT NO.	DASH NO.	DASH NO.**	DASH NO.	DASH NO.**	DASH NO.
9.525 11.125 12.700 14.275	+0 -.787	1 2 3 4	27 28 29 30	53 54 55 56		104 105	130	
15.875 19.050 22.225 25.400		5 6 7 8	31 32 33 34	57 58 59 60	82 83 84 85	106 107 108 109	131 132 133 134	155 156 157 158
28.575 31.750 34.925 38.100 44.450 50.800	+0 -1.575	9 10 11 12 13 14	35 36 37 38 39 40	61 62 63 64 65 66	86 87 88 89 90 91	110 111 112 113 114 115	135 136 137 138 139 140	159 160 161 162 163 164
57.150 63.500 69.850 76.200 82.550		15 16 17 18 19	41 42 43 44 45	67 68 69 70 71	92 93 94 95 96	116 117 118 119 120	141 142 143 144 145	165 166 167 168 169
88.900 95.250 101.600 107.950 114.300	+0 -2.388	20 21 22 23 24	46 47 48 49 50	72 73 74 75 76	97 98 99 100 101	121 122 123 124 125	146 147 148 149 150	170 171 172 173 174
120.650 127.000 139.700 152.400		25 26	51 52	77 78	102 103	126 127 128 129	151 152 153 154	175 176 177 178

NOTE:

- ALL DIMENSIONS ARE IN MILLIMETERS (MM), UNLESS OTHERWISE SPECIFIED AND ARE BASED ON AN APPROXIMATE CONVERSION FACTOR OF 25.4 MM EQUAL ONE INCH.
- FOR ADDITIONAL SIZES SEE SHEET 4.
- \*\*1. INACTIVE FOR NEW DESIGN AFTER 21 JUNE 1976.

INTERNATIONAL TITLE  
AR SCREW, CAP, HEXAGON HEAD (FINISHED HEXAGON BOLT), ALLOY STEEL, GRADE 8, ZINC COATED, UNF-2A, PLAIN AND SELF-LOCKING TYPE

PROUREMENT SPECIFICATION SUPERSIDES  
FF-S-85 SEE NOTE 12

MILITARY STANDARD  
MS90727

SHEET 4 OF 5

REVISOR (A) 1 AUG 1967 (B) 14 OCT 1968 (C) 1 MAY 1969 (D) 22 OCT 1970 (E) FOR CHANGES SEE SHEETS 1, 2, 3, 4, AND 5

APPROVED 6 MAY 63

DD 672-1

5305-1747

TABLE IV  
METRIC TRANSLATION OF TABLE II

NOMINAL SIZE	MM	19.050	22.225	25.400	28.575	31.750	34.925	38.100
B THREAD PITCH		1.588	1.814	2.117	2.117	2.117	2.117	2.117
D BODY DIAMETER	MAX MIN	19.050 18.821	22.225 21.996	25.400 25.146	28.575 28.296	31.750 31.471	34.925 34.620	38.100 37.795
F WIDTH ACROSS FLATS	MAX MIN	28.575 27.940	33.938 33.639	38.100 37.313	42.862 41.427	47.625 46.025	52.388 50.648	57.150 55.245
G WIDTH ACROSS CORNERS	MAX MIN	32.995 31.852	38.506 37.211	43.994 42.545	49.505 47.219	54.991 52.476	60.503 57.734	65.989 62.992
H HEAD HEIGHT	MAX MIN	12.268 11.557	14.300 13.487	15.926 15.011	18.237 16.713	20.650 19.025	22.301 20.574	24.740 22.911
R RADIUS	MAX MIN	1.143 1.508	1.651 1.016	2.413 1.524	2.413 1.524	2.413 1.524	2.413 1.524	2.413 1.524
**MIN TENSILE STRENGTH-KN		252.500	343.800	447.300	572.800	724.500	887.400	1067.400
L LENGTH	TOLERANCE		DASH NO.	DASH** NO.	DASH NO.	DASH NO.	DASH NO.	DASH NO.
	SIZE 19.050	SIZE 22.225 AND OVER						
19.050	+0	+0	179					
22.225	-0.787	-1.575	180	202				
25.400			181	203	224			
28.575			182	204	225	245		
31.750	+0	+0	183	205	226	246	265	
34.925	-1.575	-3.175	184	206	227	247	266	284
38.100			185	207	228	248	267	285
44.450			186	208	229	249	268	286
50.800			187	209	230	250	269	287
57.150			188	210	231	251	270	288
63.500			189	211	232	252	271	289
69.850			190	212	233	253	272	290
76.200			191	213	234	254	273	291
82.550			192	214	235	255	274	292
88.900	+0	+0	193	215	236	256	275	293
95.250	-2.388	-4.775	194	216	237	257	276	294
101.600			195	217	238	258	277	295
107.950			196	218	239	259	278	296
114.300			197	219	240	260	279	297
120.650			198	220	241	261	280	298
127.000			199	221	242	262	281	299
133.300			200	222	243	263	282	300
152.400			201	223	244	264	283	301

NOTE:

- ALL DIMENSIONS ARE IN MILLIMETERS (mm), UNLESS OTHERWISE SPECIFIED AND ARE BASED ON AN APPROXIMATE CONVERSION FACTOR OF 25.4 mm EQUAL ONE INCH.
- THREAD LENGTH:** MINIMUM THREAD LENGTH SHALL BE TWICE THE DIAMETER PLUS 6.350 mm. THE TOLERANCE SHALL BE PLUS 4.775 mm ON 2-1/2 THREADS, WHICHEVER IS GREATER. ON SCREWS THAT ARE TOO SHORT FOR MINIMUM THREAD LENGTH, THE DISTANCE FROM THE BEARING SURFACE OF THE HEAD TO THE FIRST COMPLETE THREAD SHALL NOT EXCEED THE LENGTH OF 2-1/2 THREADS FOR SIZES UP TO AND INCLUDING 25.400 mm (1 INCH). OTHERWISE, THE DISTANCE SHALL BE GREATER THAN 25.400 mm.

\*\*1. INACTIVE FOR NEW DESIGN AFTER 21 JUNE 1976.

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PA AR INTERNATIONAL TITLE  
INTEREST  
Other Cust 99  
SCREW, CAP, HEXAGON HEAD (FINISHED HEXAGON BOLT), ALLOY STEEL, GRADE 8, ZINC COATED, UNF 2A, PLAIN AND SELF-LOCKING (E)

MILITARY STANDARD  
MS90727

PROCUREMENT SPECIFICATION SUPERSEDES  
FF-S-85 SEE NOTE 12

SHEET 5 OF 5