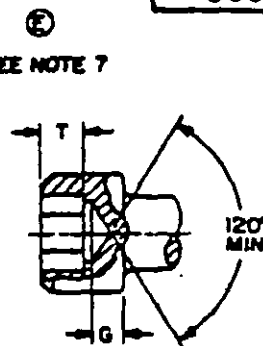
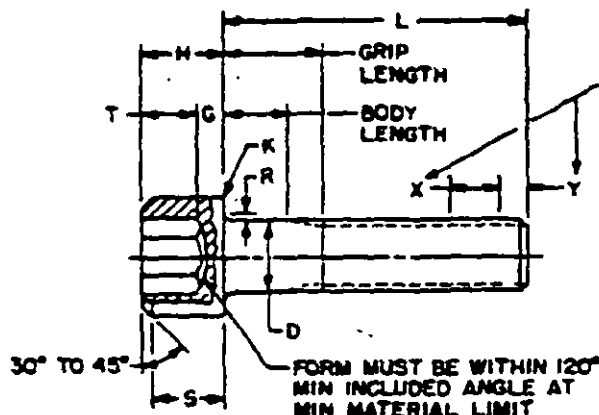
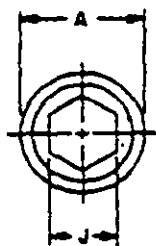


REVISION: AT, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ



ACCEPTABLE SOCKET DESIGN

TABLE I

NOMINAL SIZE		(#0)	(#6)	(#8)	(F10)		(1/4)		(5/16)				
		.060	.138	.164	.190		.250		.3125				
THREADS PER INCH UNF-3A		80	40	35	32		28		24				
D BODY DIAMETER	MAX	.0600	.1380	.1640	.1900		.2500		.3125				
	MIN	.0548	.1329	.1585	.1840		.2435		.3053				
A HEAD DIAMETER	MAX	.094	.226	.270	.3125		.3750		.4688				
	MIN	.091	.218	.262	.303		.365		.457				
H HEAD HEIGHT	MAX	.060	.138	.164	.190		.250		.3125				
	MIN	.057	.134	.159	.185		.244		.306				
S HEAD SIDE HGT	MIN	.054	.124	.148	.171		.225		.281				
J SOCKET WIDTH ACROSS FLATS	MAX	.0510	.1111	.1424	.1587		.1900		.2330				
	MIN	.0500	.1094	.1406	.1562		.1875		.2300				
T KEY ENGAGEMENT	MIN	.023	.064	.077	.090		.120		.151				
G WALL THICKNESS	MIN	.020	.047	.058	.065		.095		.119				
K CHAMFER OR RADIUS	MAX	.003	.003	.005	.005		.008		.008				
R FILLET EXTENSION	MAX	.007	.010	.012	.014		.014		.017				
	MIN	.003	.006	.007	.009		.009		.012				
TENSILE STRENGTH LBS - MIN		270	1,370	2,290	3,110		5,680		9,100				
L LENGTH	TOLERANCE	DASH NO.	DASH NO.	DASH NO.	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN
.125	+.000 -.031	1											
.188		2											
.250		3	9										
.375		4	10	18	26				40			55	
.500		5	11	19	27				41				
.625	+.000 -.040		12	21	28				42			56	
.750			13	23	29				43			57	
.875					30				44			58	
1.000					31				45			59	
1.250						32	.175	.167	46			60	
1.500					33	.175	.167	47	.500	.250	61		
1.750					34	.175	.167	48	.500	.250	62	.625	.347
2.000					35	.175	.167	49	1.000	.750	63	.625	.347
2.250								50	1.000	.750	64	1.125	.847
2.500										65	1.125	.847	

For notes see sheet 2.

(E) For changes see sheets 1, thru 3.

P.A. MC Drawn AS 99	TITLE (E) SCREW,CAP, SOCKET HEAD AND SCREW,CAP, SOCKET HEAD, SELF-LOCKING: ALLOY STEEL, CADMIUM PLATED, UNF-3A	MILITARY STANDARD MS16998
PROCUREMENT SPECIFICATION FF-S-86	SUPERSEDED BY: 3.1, 3.2; 3.014 and 4.2 MS35456, MS35458 and MS35460 in part	SHEET 1 OF 3

APPROVED 5 APR 1962 REVISED (A) 21 FEB 1963 (B) 15 JUL 1963 (C) 25 MAR 1965 (D) 22 OCT 1970 (E) 31 DEC 1976

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

REQ. SUP CLASS
5305

TABLE I (Cont'd)

NOMINAL SIZE		(3/8)	(7/16)	(1/2)	(5/8)								
THREADS PER INCH UNF-3A		24	20	20	18								
D BODY DIAMETER	MAX	.3750	.4375	.5000	.6250								
	MIN	.3678	.4294	.4919	.6163								
A HEAD DIAMETER	MAX	.5625	.6562	.750	.9375								
	MIN	.550	.642	.735	.921								
H HEAD HEIGHT	MAX	.375	.4375	.500	.625								
	MIN	.368	.430	.492	.616								
S HEAD SIDE HGT	MIN	.337	.394	.450	.562								
J SOCKET WIDTH ACROSS FLATS	MAX	.3160	.3790	.3790	.5050								
	MIN	.3123	.3750	.3750	.5000								
T KEY ENGAGEMENT	MIN	.162	.213	.245	.307								
C WALL THICKNESS	MIN	.143	.166	.190	.236								
Z CHAMFER OR RADIUS	MAX	.008	.010	.010	.010								
R FILLET EXTENSION	MAX	.020	.023	.026	.032								
	MIN	.015	.018	.020	.024								
TENSILE STRENGTH 1/8 - MIN		11,800	18,700	25,200	40,400								
LENGTH	TOLERANCE		GRIP LENGTH MAX	BODY LENGTH MIN	(E) - DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN
	SIZE .375	OVER .375											
.500													
.625													
.750	+.0000	+.0000											
.875	-.031	-.031											
1.000								95			106		
1.250								96			107		
1.500								97			108		
1.750	+.0000	+.0000						98			109		
2.000	-.040	-.060				.625	.268	99			110		
2.250													
2.500								100	.750	.365	111		
3.000								101	.750	.365	112	.750	.295
4.000	-.060	-.080						102	1.500	1.115	113	.750	.295

NOTES:

1. MATERIAL: Alloy steel in accordance with procurement specification.
2. PROTECTIVE COATING: Cadmium plated in accordance with procurement specification.
3. THREADS: The threads shall be in accordance with procurement specification.
4. THREAD LENGTH: Screws above heavy line shall have complete (full form) threads extending within two threads of the head as measured with a thread ring gauge.
5. DIMENSIONS: All dimensions are in inches unless otherwise specified.
6. HEAD: The head may or may not be knurled, at the manufacturer's option. Type of knurling optional.
7. SELF-LOCKING ELEMENT: (a) The self-locking element shall be a patch type or longitudinal strip in accordance with MIL-F-18240.
(b) For "I" and "T" dimensions, design and usage limitations, see MS15981.
(c) Maximum ring gage diameter that the locking region of screw must pass thru freely or with finger pressure shall be the nominal size plus 0.010.
8. TENSILE STRENGTH: Based on 160,000 PSI minimum ultimate tensile strength. Load pounds are calculated by the stress area indicated in the Screw-Thread Standards for Federal Service, Handbook M28.
9. PART NUMBER: The MS part number consists of the MS number, plus the dash number. For screws with the self-locking element add the letter "L" after the dash number.
Example: MS16998-1 Plain Screw
MS16998-1L Self-locking Screw
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.

(E) NOW INACTIVE FOR NEW DESIGN AFTER 31 DECEMBER 1976.

P.A.	WC	TITLE	MILITARY STANDARD
Order	AS	(E) SCREW,CAP,SOCKET HEAD AND	
	99	SCREW,CAP,SOCKET HEAD,SELF-LOCKING:	
		ALLOY STEEL,CADMIUM PLATED,UNF-3A	MS16998
PROCUREMENT SPECIFICATION		SUPERSEDES: MS15981, 3.1.1, 3.2.1; MS15981 and 4.2	
77-5-86		MS159456, MS159458 and MS159460 in part	
			PAGE 2 OF 5

REVISIONS: AT, AV, EA, IS, MI, MU, RA, RS, SS
USER: ME, PA, WT, YD

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

APPROVED 5 APR 1962 REVISED (E) For changes see sheets 1 thru 5

The screws covered by dash numbers given in MS35436, MS35458 and MS35460 that are replaced by applicable dash numbers in this document are canceled after 5 April 62. Use the dash numbers given in the preceding sheets. 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. Replacement shall be in accordance with this table. Interchangeability information regarding part numbers on superseded drawings are also contained in this table.

PART NUMBERS		PART NUMBERS		PART NUMBERS	
CANCELLED	SUPERSEDING	CANCELLED	SUPERSEDING	CANCELLED	SUPERSEDING
MSJ3436 MSJ3458 MSJ3460	MS16998	MSJ3436 MSJ3458 MSJ3460	MS16998	MSJ3436 MSJ3458 MSJ3460	MS16998
Dash No.	Dash No.	Dash No.	Dash No.	Dash No.	Dash No.
1	9	22	42	53	61
2	10	23	43	62	93
3	11	24	44	63	96
4	12	25	45	64	97
5	13	26	46	65	98
6	18	27	47	66	99
7	19	28	48	67	100
8	21	29	49	68	101
10	26	30	50	69	102
11	27	42	70		
12	28	43	71		
13	29	44	72		
14	30	45	73		
15	31	46	74		
16	32	47	75		
17	33	48	76		
18	34	49	77		
19	35	50	78		
20	40	51	79		
21	41	52	80		

Screws covered by the following part numbers are inactive for Design and Engineering. They shall be used for maintenance of existing equipment to replace the 5/16, 7/16 and 5/8 inch size screws used in counterbored holes or other close applications.

PART NO.	PART NO.	PART NO.	PART NO.	PART NO.	PART NO.
INACTIVE	INACTIVE	INACTIVE	INACTIVE	INACTIVE	INACTIVE
MSJ3456	MSJ3456	MSJ3456	MSJ3456	MSJ3456	MSJ3456
MSJ3458	MSJ3458	MSJ3458	MSJ3458	MSJ3458	MSJ3458
MSJ3460	MSJ3460	MSJ3460	MSJ3460	MSJ3460	MSJ3460
Dash No.	Dash No.	Dash No.	Dash No.	Dash No.	Dash No.
31	33	39	55	71	73
32	36	40	56	72	76
33	37	41	58	73	77
34	38	54	70	74	

P.A. WC Other Cost AS 99	TITLE (E) SCREW,CAP,SOCKET HEAD AND SCREW,CAP,SOCKET HEAD,SELF-LOCKING: ALLOY STEEL,CADMIUM PLATED,UNF-3A	MILITARY STANDARD MS16998
PROUREMENT SPECIFICATION FY-S-86	SUPERSEDED BY: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2 MS33456, MS33457, MS33458, MS33459, MS33460, MS33461, MS33462, MS33463, MS33464, MS33465, MS33466, MS33467, MS33468, MS33469, MS33470, MS33471, MS33472, MS33473, MS33474, MS33475, MS33476, MS33477, MS33478, MS33479, MS33480, MS33481, MS33482, MS33483, MS33484, MS33485, MS33486, MS33487, MS33488, MS33489, MS33490, MS33491, MS33492, MS33493, MS33494, MS33495, MS33496, MS33497, MS33498, MS33499, MS33500, MS33501, MS33502, MS33503, MS33504, MS33505, MS33506, MS33507, MS33508, MS33509, MS33510, MS33511, MS33512, MS33513, MS33514, MS33515, MS33516, MS33517, MS33518, MS33519, MS33520, MS33521, MS33522, MS33523, MS33524, MS33525, MS33526, MS33527, MS33528, MS33529, MS33530, MS33531, MS33532, MS33533, MS33534, MS33535, MS33536, MS33537, MS33538, MS33539, MS33540, MS33541, MS33542, MS33543, MS33544, MS33545, MS33546, MS33547, MS33548, MS33549, MS33550, MS33551, MS33552, MS33553, MS33554, 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REVISED AT: AF, EA, II, MI, MO, MSA, OS
USIA: NE, PA, W, YD

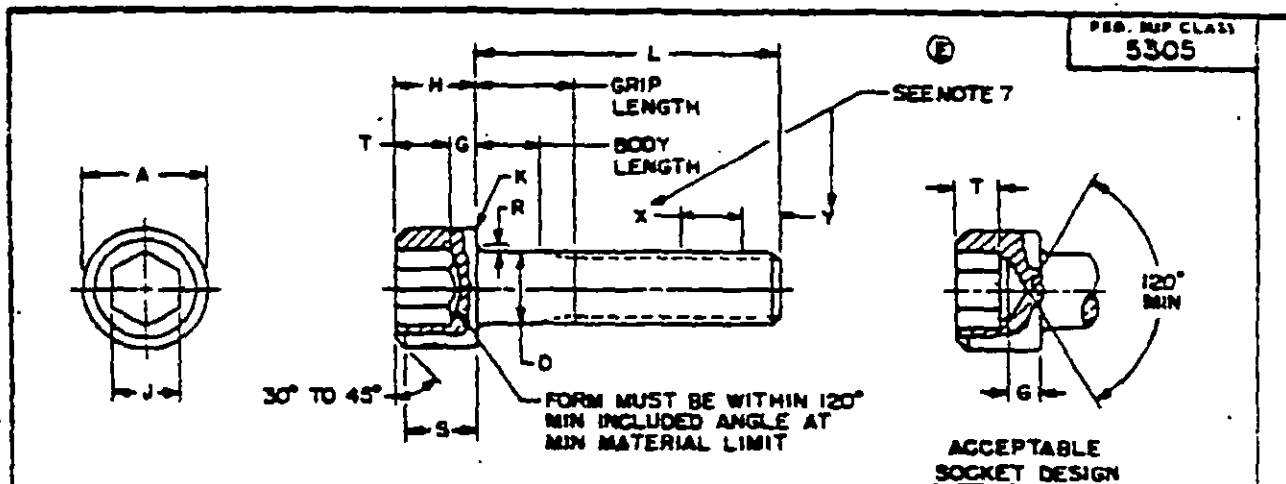


TABLE III
METRIC TRANSLATION OF TABLE I

NOMINAL SIZE mm		1.524	3.305	4.166	4.826		6.350			7.938			
THREADS PER 25.4 mm UNF-3A		80	40	36	32		28			24			
D BODY DIAMETER	MAX	1.524	3.305	4.166	4.826		6.350			7.938			
	MIN	1.443	3.376	4.026	4.674		6.185			7.755			
A HEAD DIAMETER	MAX	2.438	5.740	6.858	7.938		9.550			11.908			
	MIN	2.311	5.537	6.655	7.694		9.271			11.608			
H HEAD HEIGHT	MAX	1.524	3.305	4.166	4.826		6.350			7.938			
	MIN	1.448	3.404	4.039	4.699		6.198			7.772			
S HEAD SIDE HGT	MIN	1.372	3.150	3.739	4.343		5.715			7.137			
J SOCKET WIDTH ACROSS FLATS	MAX	1.295	3.822	3.622	4.031		4.826			5.426			
	MIN	1.270	2.779	3.571	3.967		4.762			5.350			
T KEY ENGAGEMENT	MIN	.635	1.626	1.936	2.286		3.049			3.835			
C WALL THICKNESS	MIN	.508	1.184	1.422	1.651		2.413			3.023			
K CHAMFER OR RADIUS	MAX	.076	.127	.127	.127		.203			.203			
R FILLET EXTENSION	MAX	.178	.254	.303	.356		.354			.432			
	MIN	.076	.152	.178	.229		.229			.303			
• TENSILE STRENGTH (E) MIN - MIN		1.215	7.065	10.305	13.995		25.360			40.950			
L LENGTH	TOLERANCE	DASH NO.	DASH NO.	DASH NO.	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN
3.175	+ .000 - .787	1											
4.775		2											
6.350		3	9	18	26								
9.525		4	10	19	27			40				51	
12.700		5	11					41					
15.875	+ .000 - 1.016		12	21	28			42			56		
19.050			13		29			43			57		
22.225					30			44			58		
					31			45			59		
25.400													
31.750	+ .000 - 1.016				32	9.525	4.242	46			60		
38.100					33	9.525	4.242	47	12.700	6.350	61		
44.450					34	22.225	16.942	48	12.700	6.350	62	15.875	8.814
50.800					35	22.225	16.943	49	25.400	19.050	63	15.875	8.814
57.150								50	25.400	19.050	64	28.375	21.514
63.500											65	28.375	21.514

NOTE: All dimensions are in millimeters (mm), unless otherwise specified and are based on an approximate conversion factor of 25.4mm equal one inch.

P.A. VC Qty Car AS 99	TITLE SCREW, CAP, SOCKET HEAD AND SCREW, CAP, SOCKET HEAD, SELF-LOCKING; ALLOY STEEL, CADMIUM PLATED, UNF-3A	MILITARY STANDARD MS16998
PROPOSED SPECIFICATION FF-5-86	REFERENCES: BOMBS, 3.1, 3.2; BOMBS 4 and 4.2 MS15456, MS15458 and MS15460 in part	SHEET 4 OF 5

DD FORM 672-1

REPRODUCED FROM THE SOURCE AND MODIFIED.

APPROVED 5 APR 1982 REVISED (E) For changes see sheets 1 thru 5

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5305

TABLE 111 (Cont'd)
METRIC TRANSLATION OF TABLE I

NOMINAL SIZE mm			9.525		11.112		12.700		15.875					
THREADS per 25.4mm UNF-3A			24		20		20		18					
D BODY DIAMETER MAX			9.525		11.112		12.700		15.875					
MIN			9.342		10.907		12.494		15.634					
A HEAD DIAMETER MAX			14.288		16.667		19.050		23.812					
MIN			13.970		16.307		18.669		23.393					
H HEAD HEIGHT MAX			9.525		11.112		12.700		15.875					
MIN			9.347		10.922		12.497		15.646					
S HEAD SIDE HGT MIN			8.560		10.006		11.430		14.275					
J SOCKET WIDTH MAX			8.026		9.627		9.627		12.827					
ACROSS FLATS MIN			7.938		9.525		9.525		12.700					
T KEY ENGAGEMENT MIN			4.623		5.410		6.223		7.798					
G WALL THICKNESS MIN			3.632		4.216		4.826		6.045					
K CHAMFER OR RADIUS MAX			.203		.254		.254		.254					
R FILLET MAX			.508		.584		.660		.813					
EXTENSION MIN			.381		.457		.508		.610					
• TENSILE STRENGTH LN - MIN (E)			62.100		84.150		113.400		181.800					
L LENGTH	TOLERANCE		DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	P = DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN	DASH NO.	GRIP LENGTH MAX	BODY LENGTH MIN
	SIZE 9.525	OVER 9.525												
12.700			70											
15.875			71											
19.050	+.000	+.000	72											
22.225	-.787	-.787	73											
25.400			74							93				106
			75				84							
31.250			76				87			96				107
38.100			77	12.700	4.750		90			97				108
44.450			78	12.700	4.750		89	15.875	6.807	98				109
50.800	+.000	+.000	79	25.400	17.450					99				110
	-1.016	-1.524	80	25.400	17.450									
57.150			81	38.100	30.150				100	19.050	9.271	111		
61.500									101	19.050	9.271	112	19.050	
76.200	-2.032	-2.032							102	38.100	28.321	113	19.050	
													7.493	
													7.493	

NOTE: All dimensions are in millimeters (mm), unless otherwise specified and are based on an approximate conversion factor of 25.4mm equal one inch.

(E) ** INACTIVE FOR NEW DESIGN AFTER 31 DECEMBER 1976.

☆ U. S. GOVERNMENT PRINTING OFFICE 1977-703-020/1079

P.A. 01 Other Code AS 99	TITLE (E) SCREW, CAP, SOCKET HEAD AND SCREW, CAP, SOCKET HEAD, SELF-LOCKING: ALLOY STEEL, CADMIUM PLATED, UNF-3A	MILITARY STANDARD MS16998
PROCUREMENT SPECIFICATION FF-S-86	SUPERSEDES BCW1, 3.1, 3.2; BCW14 and 4.2 MS35456, MS35458 and MS35460 in part.	SHEET 5 OF 5

DD FORM 672-1 (Continued)

REPLACES SERVICE OF THIS FORM AND OBSOLETE.

REVIEWED BY: AT, AT, CA, IS, MI, PU, SEA, SS
USIA: NE, PA, W, YB

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