

REVIEWER: AT, AV, IS, MI, MU, NSA, 85
USER: AS, GL, ME, OS, YD

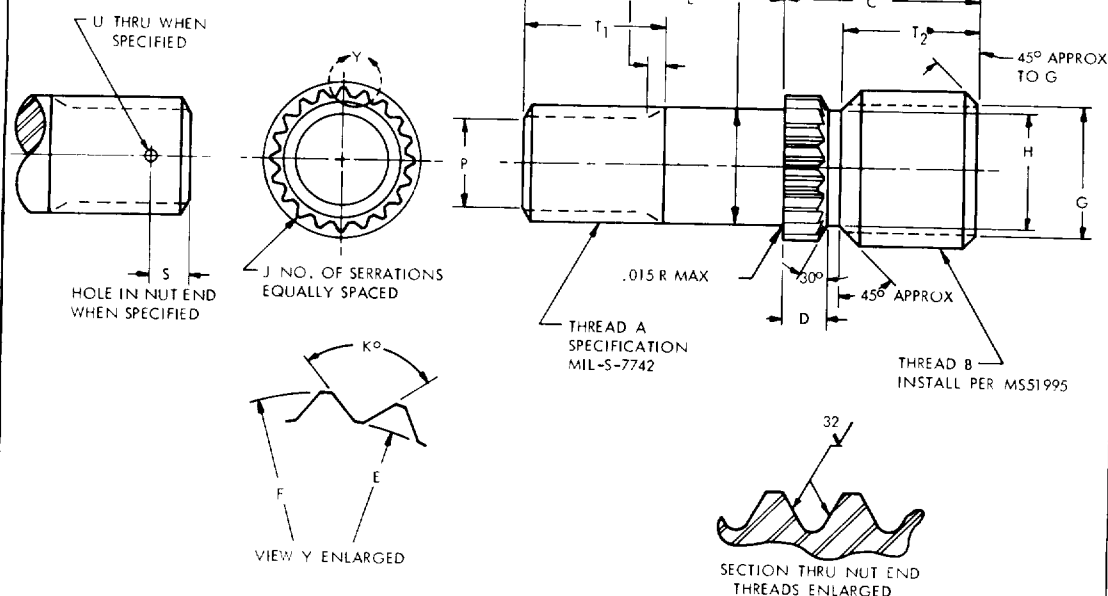


TABLE I (FINE THD NUT END - COARSE THD STUD END)

TABLE 1 (FINE THD NOT END - COARSE THD STUD END)																		
DASH NO.	A NUT END THREAD UNF-3A	B STUD END THREAD (COARSE) SEE THREAD NOTE		C ±.015	D ±.015	E DIA +.005 -.004	F DIA +.007 -.002	G DIA ±.010	H DIA	J	K° +2° -1°	T ₁ ±.015	T ₂ ±.015	P DIA ±.010	S ±.015	U DIA	LOCKING PART NO. (REF) SEE NOTE 16 (A)	
	SIZE	SIZE	PITCH DIA	MINOR DIA														
-102	.138-40	.164-32	.1461 .1446	.1280 .1215	.250	.060	.152	.175	.113	.116	14	102°	.380	.140	.096	—	—	MS51990-102P
-103	.164-36	.190-24	.1654 .1639	.1413 .1334	.380	.080	.178	.201	.122	.128	16	90°	.410	.230	.117	.110	.070	MS51990-103P
-104	.190-32	.250-20	.2204 .2187	.1915 .1824	.440	.080	.203	.230	.169	.177	13	102°	.440	.280	.137	.120	.070	MS51990-104P
-105	.250-28	.3125-18	.2795 .2778	.2474 .2373	.560	.080	.255	.284	.222	.232	17	86°	.500	.390	.190	.160	.076	MS51990-105P
-106	.3125-24	.375-16	.3378 .3358	.3017 .2906	.690	.080	.316	.345	.274	.285	20	102°	.560	.510	.242	.160	.076	MS51990-106P
-107	.375-24	.4375-14	.3946 .3926	.3534 .3411	.750	.120	.380	.407	.322	.336	24	102°	.620	.520	.305	.170	.106	MS51990-107P
-108	.4375-20	.500-13	.4537 .4512	.4093 .3963	.810	.120	.456	.487	.375	.391	26	102°	.690	.570	.354	.170	.106	MS51990-108P
-109	.500-20	.5625-12	.5122 .5097	.4641 .4503	.880	.120	.567	.601	.427	.445	26	111°	.810	.630	.416	.190	.106	MS51990-109P
-110	.5625-18	.625-11	.5699 .5674	.5174 .5028	1.000	.140	.567	.601	.477	.497	26	111°	.940	.720	.469	.220	.141	MS51990-109P
-111	.625-18	.750-10	.6891 .6866	.6314 .6156	1.120	.160	.687	.721	.588	.610	30	111°	1.000	.820	.532	.220	.141	MS51990-110P
-112	.750-16	.875-9	.8071 .8046	.7430 .7257	1.310	.160	.783	.820	.695	.721	30	111°	1.120	.990	.645	.220	.141	MS51990-111P

NOTE: For material, finish and other pertinent data, see sheet 3.

(A) For changes see sheets 1, 2, 3 and 4

P.A.	WC	TITLE	STUD, LOCKED IN - RING LOCKED, SEPARATED		(A) For changes see sheets 1, 2, 3 and 4
Other Cust	82 (A)				MILITARY STANDARD
PROCUREMENT SPECIFICATION MIL-S-45909		SUPERSEDES			MS51989
DD FORM 630-1					SHEET 1 OF 4

DD FORM 672-1 (Coordinated)
1 SEP 57

PREVIOUS EDITIONS OF THIS • • • • •

APPROVED 30 JUN 66 REVISED (A) 28 MAY 1969

This military community is particularly noteworthy for its diversity of agencies and its reputation for innovation. Over the years, new engineers and technicians have been recruited to the community from all over the world.

FED. SUP CLASS
5307

TABLE II (FINE THD NUT END - FINE THD STUD END)

DASH NO.	A	B			C +.015	D +.015	E DIA +.005 -.004	F DIA +.007 -.002	G DIA +.010	H DIA	J	K° +2° -1°	T ₁ ±.015	T ₂ ±.015	P DIA +.010	S ±.015	U DIA	LOCKRING PART NO. (REF) SEE NOTE 16 (A)
	NUT END THREAD UNF-3A	STUD END THREAD (FINE) SEE THREAD NOTE																
	SIZE	SIZE	PITCH DIA	MINOR DIA														
-202	.138-40	.164-36	.1483 .1468	.1323 .1262	.250	.060	.152	.175	.119	.121	14	102°	.380	.140	.096	—	—	MS51990-102P
-203	.164-36	.190-32	.1721 .1706	.1541 .1475	.380	.080	.178	.201	.139	.143	16	90°	.410	.250	.117	.110	.070	MS51990-103P
-204	.190-32	.250-28	.2296 .2281	.2090 .2014	.440	.080	.203	.230	.192	.197	13	102°	.440	.310	.137	.120	.070	MS51990-104P
-205	.250-28	.3125-24	.2884 .2869	.2643 .2559	.560	.080	.255	.284	.245	.251	17	86°	.500	.420	.190	.160	.076	MS51990-105P
-206	.3125-24	.375-24	.3512 .3497	.3271 .3185	.690	.080	.316	.345	.307	.306	20	102°	.560	.550	.242	.160	.076	MS51990-106P
-207	.375-24	.4375-20	.4084 .4067	.3795 .3700	.750	.120	.380	.407	.356	.365	24	102°	.620	.550	.305	.170	.106	MS51990-107P
-208	.4375-20	.500-20	.4711 .4694	.4422 .4325	.810	.120	.456	.487	.419	.427	26	102°	.690	.610	.354	.170	.106	MS51990-108P
-209	.500-20	.5625-18	.5301 .5284	.4980 .4873	.880	.120	.567	.601	.472	.482	26	111°	.810	.670	.416	.190	.106	MS51990-109P
-210	.5625-18	.625-18	.5927 .5910	.5606 .5498	1.000	.140	.567	.601	.535	.545	26	111°	.940	.780	.469	.220	.141	MS51990-109P
-211	.625-18	.750-16	.7134 .7114	.6773 .6656	1.120	.160	.687	.721	.648	.661	30	111°	1.000	.880	.532	.220	.141	MS51990-110P
-212	.750-16	.875-14	.8328 .8308	.7916 .7786	1.310	.160	.783	.820	.759	.773	30	111°	1.120	1.050	.645	.220	.141	MS51990-111P

TABLE III (COARSE THD NUT END-COARSE THD STUD END)

TABLE III (COARSE THD NOT END COARSE THD NOT END)																		
DASH NO.	A NUT END THREAD UNC-3A	B STUD END THREAD (COARSE) SEE THREAD NOTE		C ±.015	D ±.015	E DIA +.005 -.004	F DIA +.007 -.002	G DIA +.010	H DIA	J	K ° +2° -1°	T ₁ ±.015	T ₂ ±.015	P DIA ±.010	S ±.015	U DIA	LOCKRING PART NO. (REF) SEE NOTE 16 (A)	
	SIZE	SIZE	PITCH DIA	MINOR DIA														
-302	.138-32	.164-32	.1461 .1446	.1280 .1215	.250	.060	.152	.175	.113	.116	14	102°	.380	.140	.085	—	—	MS51990-102P
-303	.164-32	.190-24	.1654 .1639	.1413 .1334	.380	.080	.178	.201	.122	.128	16	90°	.410	.230	.111	.110	.070	MS51990-103P
-304	.190-24	.250-20	.2204 .2187	.1915 .1824	.440	.080	.203	.230	.169	.177	13	102°	.440	.280	.120	.120	.070	MS51990-104P
-305	.250-20	.3125-18	.2795 .2778	.2474 .2373	.560	.080	.255	.284	.222	.232	17	86°	.500	.390	.166	.160	.076	MS51990-105P
-306	.3125-18	.375-16	.3378 .3358	.3017 .2906	.690	.080	.316	.345	.274	.285	20	102°	.560	.510	.219	.160	.076	MS51990-106P
-307	.375-16	.4375-14	.3946 .3926	.3534 .3411	.750	.120	.380	.407	.322	.336	24	102°	.620	.520	.270	.170	.106	MS51990-107P
-308	.4375-14	.500-13	.4537 .4512	.4093 .3963	.810	.120	.456	.487	.375	.391	26	102°	.690	.570	.318	.170	.106	MS51990-108P
-309	.500-13	.5625-12	.5122 .5097	.4641 .4503	.880	.120	.567	.601	.427	.445	26	111°	.810	.630	.371	.190	.106	MS51990-109P
-310	.5625-12	.625-11	.5699 .5674	.5174 .5028	1.000	.140	.567	.601	.477	.497	26	111°	.940	.720	.423	.220	.141	MS51990-109P
-311	.625-11	.750-10	.6891 .6866	.6314 .6156	1.120	.160	.687	.721	.588	.610	30	111°	1.000	.820	.473	.220	.141	MS51990-110P
-312	.750-10	.875-9	.8071 .8046	.7430 .7257	1.310	.160	.783	.820	.695	.721	30	111°	1.120	.990	.583	.220	.141	MS51990-111P

P.A. WC
Other Cust 42 (A)

TITLE

STUD, LOCKED IN -
RING LOCKED, SERRATED

MILITARY STANDARD

MS51989

PROCUREMENT SPECIFICATION
MIL-S-45909

SUPERSEDES

SHEET 2 OF

DD FORM 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

This military standard is mandatory 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.

REVIEWER: AT, AV, IS, MI, MU, NSA, 85
USER: AS, GL, ME, OS, YD

APPROVED 30 JUN 66 REVISED (A) For changes see sheets 1 thru 4

REVIEWER: AT, AV, IS, MI, MU, NSA, BS
USER: AS, CL, ME, OS, YD

This military standard is mandatory 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.

TABLE IV (COARSE THD NUT END - FINE THD STUD END)

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DASH NO.	A NUT END THREAD UNC-3A	B STUD END THREAD (FINE) SEE THREAD NOTE			C + .015 - .015	D + .015 - .015	E DIA + .005 - .004	F DIA + .007 - .002	G DIA + .010	H DIA + .010	J	K + 2° - 1°	T ₁ + .015 - .015	T ₂ + .015 - .015	P DIA + .010	S + .015 - .015	U DIA	LOCKRING PART NO. (REF) SEE NOTE 16 (A)
	SIZE	SIZE	PITCH DIA	MINOR DIA														
-402	.138-32	.164-36	.1483 .1468	.1323 .1262	.250	.060	.152	.175	.119	.121	14	102°	.380	.140	.085	—	—	MS51990-102P
-403	.164-32	.190-32	.1721 .1706	.1541 .1475	.380	.080	.178	.201	.139	.143	16	90°	.410	.250	.111	.110	.070	MS51990-103P
-404	.190-24	.250-28	.2296 .2281	.2090 .2014	.440	.080	.203	.230	.192	.197	13	102°	.440	.310	.120	.120	.070	MS51990-104P
-405	.250-20	.3125-24	.2884 .2869	.2643 .2559	.560	.080	.255	.284	.245	.251	17	86°	.500	.420	.166	.160	.076	MS51990-105P
-406	.3125-18	.375-24	.3512 .3497	.3271 .3185	.690	.080	.316	.345	.307	.306	20	102°	.560	.550	.219	.160	.076	MS51990-106P
-407	.375-16	.4375-20	.4084 .4067	.3795 .3700	.750	.120	.380	.407	.356	.365	24	102°	.620	.550	.270	.170	.106	MS51990-107P
-408	.4375-14	.500-20	.4711 .4694	.4422 .4325	.810	.120	.456	.487	.419	.427	26	102°	.690	.610	.318	.170	.106	MS51990-108P
-409	.500-13	.5625-18	.5301 .5284	.4980 .4873	.880	.120	.567	.601	.472	.482	26	111°	.810	.670	.371	.190	.106	MS51990-109P
-410	.5625-12	.625-18	.5927 .5910	.5606 .5498	1.000	.140	.567	.601	.535	.545	26	111°	.940	.780	.423	.220	.141	MS51990-109P
-411	.625-11	.750-16	.7134 .7114	.6773 .6656	1.120	.160	.687	.721	.648	.661	30	111°	1.000	.880	.473	.220	.141	MS51990-110P
-412	.750-10	.875-14	.8328 .8308	.7916 .7786	1.310	.160	.783	.820	.759	.773	30	111°	1.120	1.050	.583	.220	.141	MS51990-111P

NOTES:

- (A) 1. MATERIAL: Steel, alloy, composition 4130 per MIL-S-6758.
Steel, corrosion resistant, A-286 per AMS 5734, heat treated and aged.
- (A) 2. PROTECTIVE COATING: Steel, alloy, shall be cadmium plated in accordance with QQ-P-416, Type II, Class 3.
Steel, corrosion resistant, shall be passivated in accordance with QQ-P-35.
- (A) 3. SURFACE ROUGHNESS: Machined surfaces to be 125 microinches in accordance with USAS B46.1, except serrated collar.
4. THREADS: The stud end thread has a special pitch diameter and minor diameter which installs into a national class 3 tapped hole. Threads shall be in accordance with procurement specification.
5. HEAT TREATMENT: Studs shall be heat treated 125,000 PSI minimum tensile strength in accordance with procurement specification.
6. HARDNESS: Steel, alloy, Rockwell C 26 minimum.
Steel, corrosion resistant, Brinell 269 minimum.
7. CONCENTRICITY: Shank of nut end shall be concentric with serrated collar within .006 TIR.
8. FILLETS: .015 R Maximum.
9. EDGES: Break sharp edges .003 - .015 unless otherwise specified.
10. DIMENSIONS: Dimensions in inches; to be met after plating.
11. TOLERANCES: Linear dimensions $\pm .005$, angular dimensions $\pm 2^\circ$.
- (A) 12. PART NUMBERS: The MS part number consists of the MS number, plus the dash number, plus the length dash number (table V). Add "E" in lieu of the first "dash" for corrosion resistant steels. Add "D" in lieu of the second "dash" for drilled hole in nut end. Example:
MS51989-105-24 Stud, Alloy Steel, 1.5 inch nut end length
MS51989E105-24 Stud, Cres, 1.5 inch nut end length
MS51989-105D24 Stud, Alloy Steel, drilled hole, 1.5 inch nut end length
MS51989E105D24 Stud, Cres, drilled hole, 1.5 inch nut end length

P.A. Other Cust	WC 82 (A)	TITLE STUD, LOCKED IN - RING LOCKED, SERRATED	MILITARY STANDARD MS51989
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES	SHEET 3 OF	

DD FORM 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

APPROVED 30 JUN 66 REVISED (A) For changes see sheets 1 thru 4

FED. SUP. CLASS
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13. For design feature purposes, this standard takes precedence over procurement documents referenced herein.

14. Referenced documents shall be of the issue in effect on date of invitations for bid.

- (A) 15. The dash numbers "C100, C200, C300, and C400" series cres studs in the original issue of this standard are cancelled/inactivated after the approval date of revision "A" indicated on this document. The cancelled studs should be used on existing callouts until stock is depleted. Use the new "E100, E200, E300, and E400" series cres studs for replacement of "C100, C200, C300, and C400" series cres studs in accordance with Table VII.

- (A) 16. For applicable locking dash number coding see MS 51990.

TABLE V
TABULATED LENGTHS (NUT END)

L ±.015 NUT END	LENGTH DASH NUMBER (TABLE APPLICABLE TO TABLES I, II, III, AND IV) COARSE (UNC) OR FINE (UNF) SERIES 3A THREADS										
	.138	.164	.190	.250	.3125	.375	.4375	.500	.5625	.625	.750
.250	-4										
.312	-5	-5									
.375	-6	-6	-6	-6							
.438	-7	-7	-7	-7							
.500	-8	-8	-8	-8	-8						
.562	-9	-9	-9	-9	-9	-9					
.625	-10	-10	-10	-10	-10	-10	-10				
.688	-11	-11	-11	-11	-11	-11	-11	-11			
.750	-12	-12	-12	-12	-12	-12	-12	-12	-12		
.812	-13	-13	-13	-13	-13	-13	-13	-13	-13		
.875	-14	-14	-14	-14	-14	-14	-14	-14	-14		
.938	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15	
1.000	-16	-16	-16	-16	-16	-16	-16	-16	-16	-16	
1.062	-17	-17	-17	-17	-17	-17	-17	-17	-17	-17	
1.125	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18	-18
1.188	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
1.250	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
1.312	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21	-21
1.375	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22	-22
1.438	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23	-23
1.500	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24	-24
1.562	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
1.625	-26	-26	-26	-26	-26	-26	-26	-26	-26	-26	-26
1.688	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
1.750	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
1.812	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29	-29
1.875	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30	-30
1.938	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31	-31
2.000	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32	-32
2.125	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34	-34
2.250	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36	-36
2.375	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
2.500	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40
2.625	-42	-42	-42	-42	-42	-42	-42	-42	-42	-42	-42
2.750	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44	-44
2.875	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46	-46
3.000	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48	-48
3.125	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50	-50
3.250	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52	-52
3.375	-54	-54	-54	-54	-54	-54	-54	-54	-54	-54	-54
3.500	-56	-56	-56	-56	-56	-56	-56	-56	-56	-56	-56
3.625	-58	-58	-58	-58	-58	-58	-58	-58	-58	-58	-58
3.750	-60	-60	-60	-60	-60	-60	-60	-60	-60	-60	-60
3.875	-62	-62	-62	-62	-62	-62	-62	-62	-62	-62	-62
4.000	-64	-64	-64	-64	-64	-64	-64	-64	-64	-64	-64

DASH NUMBERED PARTS ABOVE THE HEAVY LINE ARE THREADED TO THE SERRATED COLLAR. THE MAXIMUM DISTANCE FROM THE SERRATED COLLAR TO THE END OF THE THREADED SECTION SHALL BE THE MAXIMUM OF THE MAXIMUM FILLET RADIUS AND A MAXIMUM OF TWO TIMES THE DASH NUMBER. THE PARTS SHALL NOT ENTER FILLET AREA.

TABLE VI
INTERCHANGEABILITY
SEE NOTE 15

PART NUMBERS	
CANCELLED (CRES 17-10P)	NEW (CRES A-786)
MS51989	MS51989
C102	E102
C103	E103
C104	E104
C105	E105
C106	E106
C107	E107
C108	E108
C109	E109
C110	E110
C111	E111
C112	E112
C202	E202
C203	E203
C204	E204
C205	E205
C206	E206
C207	E207
C208	E208
C209	E209
C210	E210
C211	E211
C212	E212
C302	E302
C303	E303
C304	E304
C305	E305
C306	E306
C307	E307
C308	E308
C309	E309
C310	E310
C311	E311
C312	E312
C402	E402
C403	E403
C404	E404
C405	E405
C406	E406
C407	E407
C408	E408
C409	E409
C410	E410
C411	E411
C412	E412

P.A.	WC	TITLE	MILITARY STANDARD
Other Cust	27 (A)	STUD, LOCKED IN - RING LOCKED, SERRATED	MS51989
PROCUREMENT SPECIFICATION	SUPERSEDES	SHEET	4 OF
MIL-5-45909			

DD FORM 672-1 (Coordinated)

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

★ 11

APPROVED 30 JUN 66 REVISED (A) For changes see sheets 1 thru 4

REVIEWER: AT, AV, IS, MI, MU, NSA, SS
USER: AS, GL, ME, OS, YD

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