Fairchild Fasteners

Santa Ana Operations

Military Standard Fasteners, Inch & Metric Section 1 - Ring-Locked Studs

INTRODUCTION

**ROSÁN IS A COMPANY WITH OVER FORTY YEARS OF CREATIVE DESIGN, DEVELOPMENT AND MANUFACTURING EXPERIENCE.
OUR OBJECTIVE IS TO PROVIDE CUSTOMERS WITH PRODUCTS THAT EXHIBIT SIMPLE, RELIABLE AND MAINTENANCE FREE SOLUTIONS TO THEIR FASTENING AND FLUID SYSTEM PROBLEMS.**

INDEX

FORM 74-030-1D (86-02-01)

MILITARY STANDARD STUDS

Rosán Ring Locked Studs are offered in a variety of materials that meet the requirements of Aerospace and Military Specifications. They are designed to provide exceptional performance for high temperature, high loading and weight critical applications.

MS51989
This stud is designed to satisfy most stud requirements by providing a locked-in, tight fitting stud available in both 4130 alloy steel and A-286 corrosion resistant steel.

MS51992
For applications requiring a higher load rating, this stud offers maximum stud end shear engagement area and is available in materials developing a minimum tensile strength of 180,000 PSI. Titanium material is available for weight critical applications.

MS51497
This stud is an oversize replacement for MS51992.

DOD-S-63275/1A
These metric studs are similar in design and function to the MS51989/MS51992. They are mechanically locked with a serrated lock ring to prevent rotational displacement and offer sufficient thread engagement to prevent axial pull-out. These metric studs are also available in INCO 718 Nickel Base, corrosion and heat resistant material with a minimum tensile strength of 1250 MPa (180 KSI) at temperatures up to 700°C (1300°F) and in 8740 alloy steel material with minimum tensile strength of 900 MPa(130 KSI) at temperatures up to 260°C (500°F).

AS3319 thru AS3322
When Boss diameter or edge distance is a major consideration, the straight type stud offers minimum size. It also offers the advantages of a captivated lockring providing a one piece stud made of A-286 corrosion resistant steel.

Fairchild Fasteners

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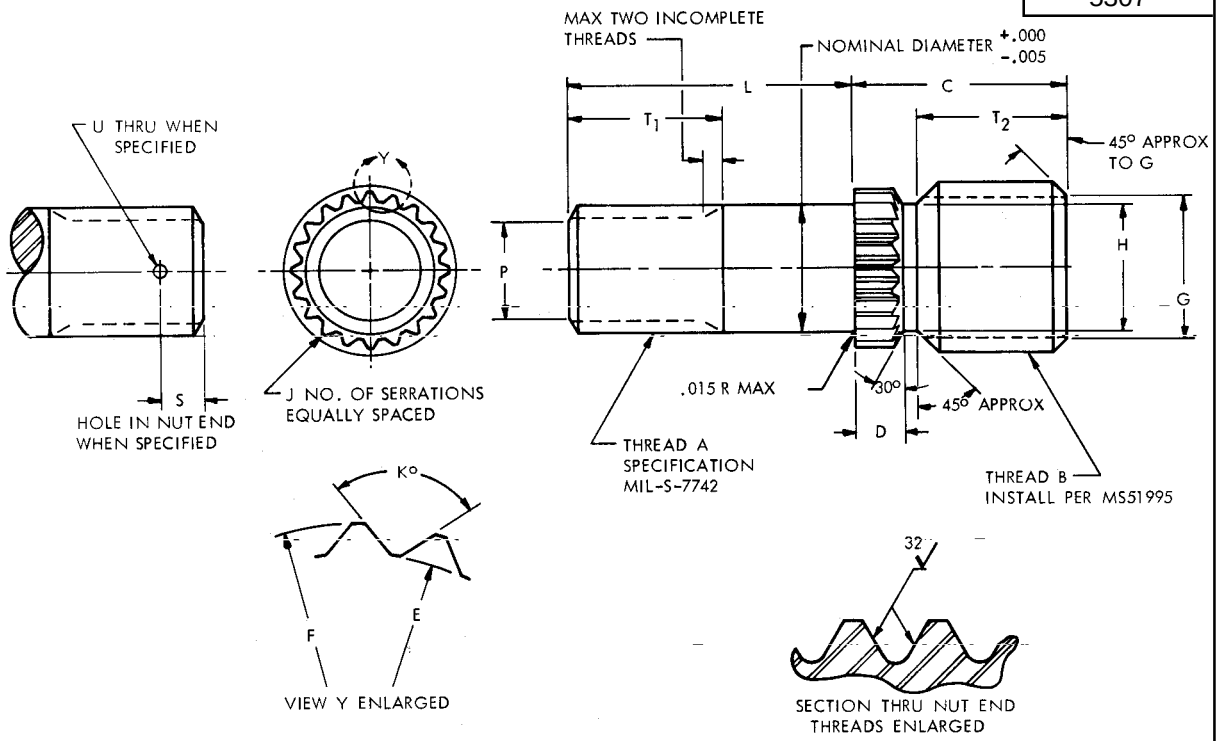

TABLE I (FINE THD NUT END - COARSE THD STUD END)

DASH NO.	A NUT END THREAD UNF-3A SIZE	B STUD END THREAD (COARSE) SEE THREAD NOTE PITCH SIZE	MINOR DIA	DIA	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
-102	.138-40	.164-32	.1461 .1446	.1280 .1215	.250	.060	.152	.175	.113	.116	14	102°	.380	.140	.096	—	—	MS51990-102P0
-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

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

APPROVED 30 JUN 66 REVISED A 28 MAY 1969

This military standard is mandatory for use by all Department 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.

P.A. WC Other Cust 82 A	TITLE STUD, LOCKED IN - RING LOCKED, SERRATED	MILITARY STANDARD MS51989
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –	SHEET 1 OF 4

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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

DASH NO.	A NUT END THREAD UNF-3A SIZE	B STUD END THREAD (FINE) SEE THREAD NOTE SIZE	PITCH DIA	MINOR DIA	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
-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°	1.1201	.050	.645	.220	.141	MS51990-111P

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

DASH NO.	A NUT END THREAD UNC-3A SIZE	B STUD END THREAD (COARSE) SEE THREAD NOTE SIZE	PITCH DIA	MINOR DIA	C ±.015	D ±.015	E DIA +.005 +.004	F DIA +.007 +.002	G DIA ±.010	H DIA	J	K° +2° -1°	T1 ±.015	T2 ±.015	P DIA ±.010	S ±.015	U DIA	LOCKRING PART NO. (REF) SEE NOTE 16 A
-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	.75	.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

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

APPROVED30 JUN 66 REVISED AFor changes see sheets 1 thru 4

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P.A. WC	TITLE	MILITARY STANDARD
Other Cust 82 A	STUD, LOCKED IN - RING LOCKED, SERRATED	MS51989
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –	SHEET 2 OF 4

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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

DASH NO.	A NUT END THREAD UNC-3A SIZE	B STUD END THREAD (FINE) SEE THREAD NOTE SIZE	PITCH DIA	MINOR DIA	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
-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	.88	.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 ±.005, angular dimensions ±2°.

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

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

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P.A. WC Other Cust 82 A	TITLE STUD, LOCKED IN - RING LOCKED, SERRATED		MILITARY STANDARD MS51989
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –		SHEET 3 OF 4

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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13. For design feature, 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 VI.

A 16. For applicable lockring 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				
.750	-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
1.500		-24	-24	-24	-24	-24	-24	-24	-24	-24	-24
1.562		-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
1.625		-26	-26	-26	-26	-26	-26	-26	-26	-26	-26
1.688		-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
1.750		-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
1.812		-29	-29	-29	-29	-29	-29	-29	-29	-29	-29
1.875		-30	-30	-30	-30	-30	-30	-30	-30	-30	-30
1.938		-31	-31	-31	-31	-31	-31	-31	-31	-31	-31
2.000		-32	-32	-32	-32	-32	-32	-32	-32	-32	-32
2.125			-34	-34	-34	-34	-34	-34	-34	-34	-34
2.250			-36	-36	-36	-36	-36	-36	-36	-36	-36
2.375			-38	-38	-38	-38	-38	-38	-38		-38
2.500			-40	-40	-40	-40		-40	-40		-40
2.625			-42	-42	-42	-42		-42	-42		-42
2.750			-44	-44	-44	-44		-44	-44		-44
2.875			-46	-46	-46	-46		-46	-46		-46
3.000			-48	-48	-48	-48		-48	-48		-48
3.125			-50	-50	-50	-50		-50	-50		
3.250			-52	-52	-52	-52		-52	-52		
3.375			-54	-54	-54	-54		-54	-54		
3.500			-56	-56	-56	-56		-56	-56		
3.625			-58	-58	-58	-58		-58	-58		
3.750			-60	-60	-60	-60		-60	-60		
3.875				-62	-62	-62					
4.000				-64	-64	-64					

A
TABLE VI
INTERCHANGEABILITY
SEE NOTE 15

PART NUMBERS	
CANCELLED (CRES 17-10P)	NEW (CRES A-286)
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

DASH NUMBERED PARTS ABOVE THE HEAVY LINE ARE THREADED TO THE SERRATED COLLAR AS SPECIFIED HEREIN. THE MAXIMUM DISTANCE FROM THE SERRATED COLLAR TO THE FIRST FULL THREAD SHALL BE EQUAL TO THE SUM OF THE MAXIMUM FILLET RADIUS AND A MAXIMUM OF TWO INCOMPLETE THREADS. INCOMPLETED THREADS NOT TO ENTER FILLET AREA.

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

APPROVED 30 JUN 66 REVISED AFor changes see sheets 1 thru 4

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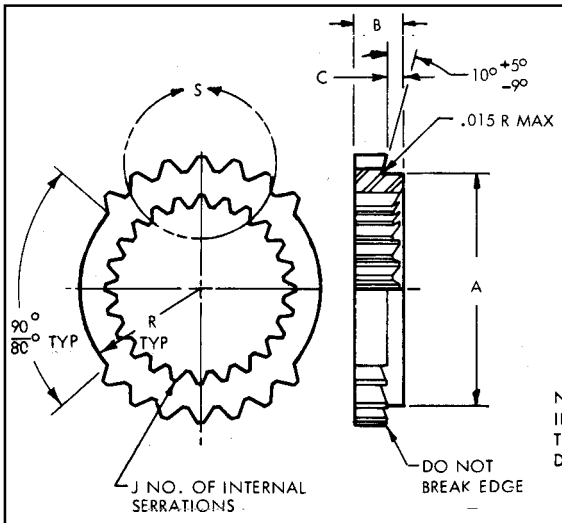
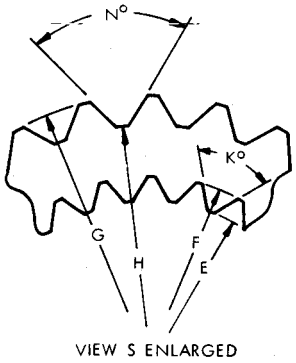
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –	SHEET 4 OF

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

FED. SUP CLASS
5340





VIEW S ENLARGED

NO SPECIFIC ANGULARITY EXISTS BETWEEN INTERNAL AND EXTERNAL SERRATIONS. THE SERRATED SECTORS WILL BE LOCATED DIAMETRICALLY OPPOSITE.

TABLE I

DASH NUMBERS	A DIA	B	C	E DIA +.004 -.003	F DIA	G DIA +.005 -.004	H DIA +.003 -.006	J	K° +1° -2°	N°	R RAD
-102P	.223	.084	.027	.161	.189	.274	.246	14	102°	100°	.120
-103P	.255	.099	.040	.189	.223	.308	.279	16	90°	100°	.135
-104P	.298	.099	.040	.213	.252	.354	.324	13	102°	90°	.159
-105P	.343	.112	.040	.266	.315	.399	.363	17	86°	90°	.180
-106P	.400	.138	.040	.323	.364	.468	.430	20	102°	90°	.214
-107P	.480	.145	.040	.390	.425	.545	.511	24	102°	90°	.252
-108P	.560	.145	.040	.468	.505	.624	.589	26	102°	90°	.293
-109P	.702	.161	.049	.574	.613	.767	.731	26	111°	100°	.362
-110P	.837	.176	.056	.695	.740	.910	.871	30	111°	100°	.431
-111P	.958	.176	.056	.795	.845	1.040	.994	30	111°	111°	.492
-112P	1.078	.176	.056	.908	.950	1.170	1.113	38	102°	102°	.551
-113P	1.232	.193	.070	1.035	1.093	1.326	1.274	36	111°	111°	.629
-114P	1.371	.193	.070	1.189	1.247	1.456	1.402	48	90°	102°	.692
-115P	1.509	.193	.070	1.282	1.339	1.611	1.551	42	111°	111°	.770

TABLE II
INTERCHANGEABILITY
SEE NOTE 12

PART NUMBERS	
CANCELLED	NEW
MS51990	MS51990
-102	-102P
-103	-103P
-104	-104P
-105	-105P
-106	-106P
-106	-106P
-107	-107P
-108	-108P
-109	-109P
-110	-110P
-111	-111P
-112	-112P
-113	-113P
-114	-114P
-115	-115P
C102	E102P
C103	E103P
C104	E104P
C105	E105P
C106	E106P
C107	E107P
C108	E108P
C109	E109P
C110	E110P
C111	E111P
C112	E112P
C113	E113P
C114	E114P
C115	E115P

NOTES:

1. MATERIAL: Steel, carbon, composition C1117, in accordance with Federal Standard mber 66. Steel, corrosion resistant, A-286 per AMS 5734, heat treated and aged.
2. PROTECTIVE COATING: Steel, carbon, 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.
3. SURFACE ROUGHNESS: Machined surfaces to be 125 microinches in accordance with USAS B46.1, except serrations.
4. HARDNESS: Rings of carbon steel shall be case hardened to RC 36-45 in accordance with procurement specification. Rings of corrosion resistant steel shall be hardened to Brinell 269 minimum in accordance with procurement specification.
5. FILLETS: Fillets shall be .015 R maximum.
6. EDGES: Break sharp edges, .003 - .015 unless otherwise specified.
7. DIMENSIONS: Dimensions in inches.
8. TOLERANCES: Linear dimensions ± .005, angular dimensions ±2°
9. PART NUMBERS: The MS part number consists of the MS number, plus the dash number. Add "E" in lieu of "dash" for corrosion resistant steel. EXAMPLE:
   MS51990-104P Lockring, Carbon Steel, Partial Serrations
   MS51990E104p Lockring, Cres, Parial Serration
10. For design feature purposes, this standard takes precedence over procurement documents referenced herein.
11. Referenced documents shall be of the issue in effect on the date of invitations for bid.
12. The dash numbers "-100" and "C100" series lockrings in the original issue of this standard are cancelled inactivated after the approval date of revision "A" indicated on this document. The cancelled lockrings should be used on existing callouts until stock is depleted. Use the new "-100P" and "E100P" series lockrings for replacement of "-100" and "C100" series lockrings in accordance with table II. Use "-100P" and "E100P" lockrings for all new design.

A ENTIRE STANDARD REVISED

APPROVED 30 JUN 66 REVISED A 10 Feb 69

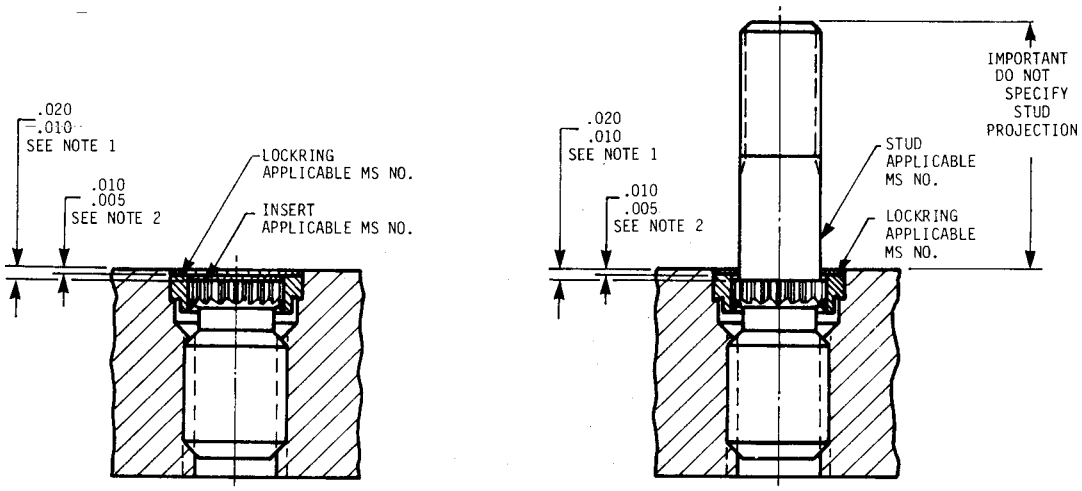
REVIEWER: AV, EL, IS, MI, MU, 85
USER: AS, AT, ME, OS, YD

This military standard is mandatory for use by all Department 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.

P.A. WC	TITLE	MILITARY STANDARD
Other Cust 82	RING LOCKED, SERRATED	MS51990
PROCUREMENT SPECIFICATION MIL-I-45910	SUPERSEDES: –	SHEET 1 OF 1

DD FORM 1 SEP 67 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

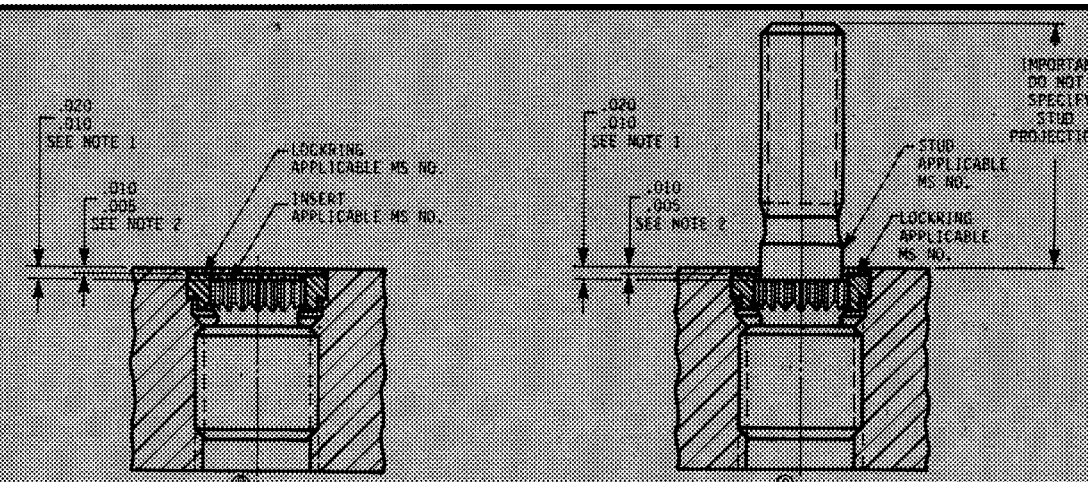
FED. SUP CLASS
53GP



MS51991 INSERT WITH MS51990 LOCKRING

MS51989 STUD WITH MS51990 LOCKRING

HOLE PREPARATION IN ACCORDANCE WITH MS51994 PER APPLICABLE EXTERNAL THREAD OF INSERT OR STUD END THREAD OF STUD AND CORRESPONDING DASH NUMBER.



MS51993 INSERT AND MS51496 OVERSIZE INSERT WITH MS51997 LOCKRING

MS51992 STUD AND MS51497 OVERSIZE STUD WITH MS51987 LOCKRING

HOLE PREPARATION IN ACCORDANCE WITH MS51994 PER APPLICABLE EXTERNAL THREAD OF INSERT OR STUD END THREAD OF STUD AND CORRESPONDING DASH NUMBER.

NOTES:

1. INSTALL INSERT OR STUD TO DEPTH SHOWN.
2. DRIVE LOCKRING TO DEPTH SHOWN.
3. TYPICAL DRAWING CALLOUT TO BE LOCATED IN VICINITY OF PART IDENTIFICATION:

FOR INSERT	FOR STUD
INSTALL INSERT IN ACCORDANCE WITH MS51995	INSTALL STUD IN ACCRODANCE WITH MS51995
INSERT VIEW	STUD VIEW

4. REPLACEMENT OF INSERTS, STUDS AND LOCKRINGS IS MADE WITH SAME SIZE PARTS AS THOSE REMOVED, USE ABOVE INSTALLATION PROCEDURE EXCEPT BEFORE DRIVING NEW LOCKRING, ROTATE THE LOCKRING EXTERNAL SERRATIONS TO A POSTITION ALIGNED WITH THOSE IN PARENT MATERIAL. iF MATERIAL IS DAMAGED. uSE OVERSIZE STUDS SPECIFIED ABOVE.
5. DIMENSIONS ARE IN INCHES.
6. IN THE EVENT OF A CONFLICT BETWEEN THE TEXT OF THIS STANDARD AND THE REFERENCES, CITED HEREIN. THE TEXT OF THIS STANDARD SHALL TAKE PRECEDENCE.

B DENOTES CHANGES

APPROVED 11 MAR 85 REVISED

User activities:
Army - MI
Navy - MC, OS

Review activities:
Army - AT, AV, ER, GL
Air Force - 11, 82
NSA - NS
DLA - IS

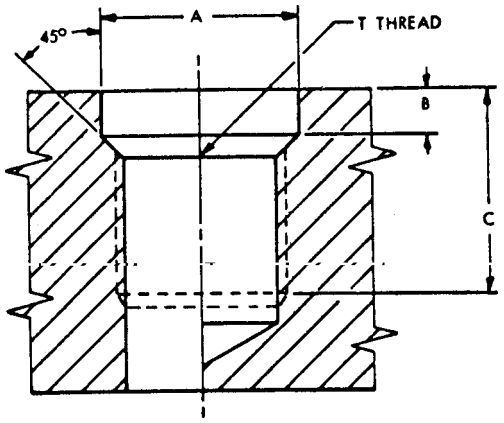
This military standard is approved for use by all Departments and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document, when applicable.

P. A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		FASTENERS, RING LOCKED INSERTS AND STUDS, INSTALLATION AND REPLACEMENT OF	MS51995
	99			
PROCUREMENT SPECIFICATION: NONE			SUPERSEDES: –	SHEET 1 OF 1

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 53GP-0147

FED. SUP CLASS
53GP

REVIEWER: EL, IS, MI, MO, MU, NSA, WC, WP, 69
USER: GL, MC, YD



1. DIAMETER “A” AND MINOR DIAMETER OF THREAD TO BE CONCENTRIC WITHIN .003 TIR.
2. AXIS OF HOLE TO BE NORMAL TO ENTRY SURFACE OR PROVIDE SPOTFACE WHEN REQUIRED.
3. NATIONAL CLASS 3 THREADS ARE PREFERRED AND RECOMMENDED TO PROVIDE A SELECTED TOLERANCE RELATIONSHIP BETWEEN PART AND TAPPED HOLE. THIS RELATIONSHIP CAN BE BEST DESCRIBED AS A “SNUG FIT”.
4. SURFACE ROUGHNESS: UNLESS OTHERWISE SPECIFIED MACHINED SURFACES TO BE 125 MICROINCHES IN ACCORDANCE WITH ASA B46.1-1962.
5. NOMINAL USE: FOR INSTALLATION OF RING LOCKED INSERTS AND STUDS.
6. INSTALLATION: PROCEDURE AND INSTALLATION OF RING LOCKED INSERTS, STUDS, AND LOCKRING, SEE MS51995.
7. REMOVE ALL BURRS AND SHARP EDGES.
8. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES, LINEAR DIMENSIONS ± .005, ANGULAR DIMENSIONS ±5°.

APPROVED 17 AUG 66 REVISED

THIS IS A DESIGN STANDARD. NOT TO BE USED AS A PART NUMBER.

P. A. AR Other Cust AS 69	TITLE HOLE PREPARATION- RING LOCKED INSERTS AND STUDS, STANDARD DIMENSIONS FOR	MILITARY STANDARD MS51994	
PROCUREMENT SPECIFICATION NOT APPLICABLE	SUPERSEDES: –	SHEET 1 OF 2	

DD FORM 1 SEP 87 672-1 (Coordinated) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

FED. SUP CLASS
53GP

NOMINAL EXTERNAL THREAD SIZE OF INSERT AND STUD END OF STUD	INSERT DASH NUMBER (MS51991) (REF)	STUD DASH NUMBER (MS51989) (REF)	T THREAD NATIONAL CLASS 3 (SEE NOTE 3)	A DIAMETER +.003 -.000				B +.030 -.000		C MIN FULL THREAD	
				INSERT IN		STUD IN					
				AL	MAG	AL	MAG	INSERT	STUD	INSERT	STUD
.164-32	— —	-102 -302	#8(.1640)-32 NC	—	—	.250	.258	—	.094	—	.285
.164-36	— —	-202 -402	#8(.1640)-36 NF	—	—	.250	.258	—	.094	—	.285
.190-24	-102 -202	-103 -303	#10(.1900)-24 NC	.250	.258	.281	.291	.094	.109	.285	.415
.190-32	— —	-203 -403	#10(.1900)-32 NF	—	—	.281	.291	—	.109	—	.415
.216-24	-103 -203	— —	#12(.2160)-24 NC	.281	.291	—	—	.109	—	.345	—
.250-20	-104 -204	-104 -304	1/4(.2500)-20 NC	.328	.337	.328	.337	.109	.109	.415	.475
.250-28	— —	-204 -404	1/4(.2500)-28 NF	—	—	.328	.337	—	.109	—	.475
.3125-18	-105 -205	-105 -305	5/16(.3125)-18 NC	.375	.381	.375	.381	.141	.141	.475	.595
.3125-24	— —	-205 -405	5/16(.3125)-24 NF	—	—	.375	.381	—	.141	—	.595
.375-16	-106 -206	-106 -306	3/8(.3750)-16 NC	.437	.448	.437	.448	.156	.156	.535	.725
.375-24	— —	-206 -406	3/8(.3750)-24 NF	—	—	.437	.448	—	.156	—	.725
.4375-14	— —	-107 -307	7/16(.4375)-14 NC	—	—	.515	.526	—	.172	—	.785
.4375-20	— —	-207 -407	7/16(.4375)-20 NF	—	—	.515	.526	—	.172	—	.785
.500-13	-107 -207	-108 -308	1/2(.5000)-13 NC	.515	.526	.593	.601	.172	.172	.595	.845
.500-20	— —	-208 -408	1/2(.5000)-20 NF	—	—	.593	.601	—	.172	—	.845
.5625-12	-108 -208	-109 -309	9/16(.5625)-12 NC	.593	.601	.734	.747	.172	.188	.655	.915
.5625-18	— —	-209 -409	9/16(.5625)-18 NF	—	—	.734	.747	—	.188	—	.915
.625-11	-109 -209	-110 -310	5/8(.6250)-11 NC	.734	.747	.734	.747	.218	.188	.725	1.035
.625-18	— —	-210 -410	5/8(.6250)-18 NF	—	—	.734	.747	—	.188	—	1.035
.750-10	-110 -210	-111 -311	3/4(.7500)-10 NC	.875	.888	.875	.888	.203	.203	.785	1.155
.750-16	— —	-211 -411	3/4(.7500)-16 NF	—	—	.875	.888	—	.203	—	1.155
.875-9	— —	-112 -312	7/8(.8750)-9 NC	—	—	1.000	1.015	—	.203	—	1.345
.875-14	-311	-212 -415	7/8(.8750)-14 NF	1.000	1.015	1.000	1.015	.203	.203	.915	1.345
1.000-12	-312.1	—	1(1.0000)-12 UNF	1.125	1.139	—	—	.203	—	1.035	—
1.125-12	-313	—	1 1/8(1.1250)-12 NF	1.281	1.298	—	—	.219	—	1.155	—
1.250-12	-314	—	1 1/4(1.2500)-12 NF	1.406	1.427	—	—	.219	—	1.285	—
1.375-12	-315	—	1 3/8(1.3750)-12 NF	1.562	1.579	—	—	.219	—	1.415	—
(a) 1.000-14	-312	—	1(1.0000)-14 NS	1.125	1.139	—	—	.203	—	1.035	—

REVIEWER: EL, IS, MI, MO, MU, NSA, WC, WP, 69
USER: GL, MC, YD

APPROVED 17 AUG 66 REVISED

This military standard has been approved by the Department of Defense and 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.

P. A. AR Other Cust AS 69	TITLE **HOLE PREPARATION- RING LOCKED INSERTS AND STUDS, STANDARD DIMENSIONS FOR**		MILITARY STANDARD **MS51994**
PROCUREMENT SPECIFICATION NOT APPLICABLE	SUPERSEDES: –		SHEET 1 OF 2

DD FORM 1 SEP 87 672-1 *(Coordinated)* PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

TOOLING FOR MS51989 STUDS

STUD DASH NUMBER MS51989	STEP DRILL [1]		WRENCH	LOCKRING DRIVE TOOL	REMOVAL TOOL [2]
	ALUMINUM	MAGNESIUM			
-102 -202	RCDC16-136 RCDC16-136	RCADC16-136 RCADC16-136	R1102W	S71D9	SM71-16
-103 -203	RCDC18-149S RCDC18-159S	RCADC18-149S RCADC18-159S	R1103W	S81D10	SM1-16
-104 -204	RCDC21-201S RCDC21-213S	RCADC21-201S RCADC21-213S	R1104W	S91D10	SM91-16
-105 -205	RCDC24-257S RCDC24-272S	RCADC24-257S RCADC24-272S	R1105W	S101D12	SM101-18
-106 -206	RCDC28-312S RCDC28-332S	RCADC28-312S RCADC28-332S	R1106W	S111D12	SM111-20
-107 -207	RCDC33-368S RCDC33-386S	RCADC33-368S RCADC33-386S	R1107XW	S121D12	SM121-22
-108 -208	RCDC38-422S RCDC38-453S	RCADC38-422S RCADC38-453S	R1108W	S131D14	SM131-24
-109 -209	RCDC47-484S RCDC47-500S	RCADC47-484S RCADC47-500S	R1110W	S141D14	SM141-26
-110 -210	RCDC47-531S RCDC47-562S	RCADC47-531S RCADC47-562S	R1110W	S151D16	SM151-28
-111 -211	RCDC56-641S RCDC56-687S	RCADC56-641S RCADC56-687S	R1111W	S161D16	SM161-30
-112 -212	RCDC64-765S RCDC64-796S	RCADC64-765S RCADC64-796S	R1112W	S181D18	SM181-34
-302 -402	RCDC16-136 RCDC16-136	RCADC16-136 RCADC16-136	R1102W	S71D9	SM71-16
-303 -403	RCDC18-149S RCDC18-159S	RCADC18-149S RCADC18-159S	R1103W	S81D10	SM81-16
-304 -404	RCDC21-201S RCDC21-213S	RCADC21-201S RCADC21-213S	R1104W	S91D10	SM91-16
-305 -405	RCDC24-257S RCDC24-272S	RCADC24-257S RCADC24-272S	R1105W	S101D12	SM101-18
-306 -406	RCDC28-312S RCDC28-332S	RCADC28-312S RCADC28-332S	R1106W	S111D12	SM111-20
-307 -407	RCDC33-368S RCDC33-386S	RCADC33-368S RCADC33-386S	R1107XW	S121D12	SM121-22
-308 -408	RCDC38-422S RCDC38-453S	RCADC38-422S RCADC38-453S	R1108W	S131D14	SM131-24
-309 -409	RCDC47-484S RCDC47-500S	RCADC47-484S RCADC47-500S	R1110W	S141D14	SM141-26
-310 -410	RCDC47-531S RCDC47-562S	RCADC47-531S RCADC47-562S	R1110W	S151D16	SM151-28
-311 -411	RCDC56-641S RCDC56-687S	RCADC56-641S RCADC56-687S	R1111W	S161D16	SM161-30
-312 -412	RCDC64-765S RCDC64-796S	RCADC64-765S RCADC64-796S	R1112W	S181D18	SM181-34

NOTES: UNLESS OTHERWISE SPECIFIED

[1] Step drills are designed for thru hole drilling. When used to drill a blind hole, it may be necessary to grind the drill to suit the depth required.

[2] See page 27 for removal instructions.

INTERCHANGEABILITY TABLES
MS VERSUS ROSÁN

STUDS

MS PART NUMBER	ROSÁN PART NUMBER
MS51989-102-(*)	SF71-4SA(*)A
MS51989-103-(*)	SF81-6SA(*)A
MS51989-104-(*)	SF91-7SA(*)A
MS51989-105-(*)	SF101-9SA(*)A
MS51989-106-(*)	SF111-11SA(*)A
MS51989-107-(*)	SF121-12SA(*)A
MS51989-108-(*)	SF131-13SA(*)A
MS51989-109-(*)	SF141-14SA(*)A
MS51989-110-(*)	SF151-16SA(*)A
MS51989-111-(*)	SF161-18SA(*)A
MS51989-112-(*)	SF181-21SA(*)A
MS51989E102-(*)	SF71-4SU(*)A
MS51989E103-(*)	SF81-6SU(*)A
MS51989E104-(*)	SF91-7SU(*)A
MS51989E105-(*)	SF101-9SU(*)A
MS51989E106-(*)	SF111-11SU(*)A
MS51989E107-(*)	SF121-12SU(*)A
MS51989E108-(*)	SF131-13SU(*)A
MS51989E109-(*)	SF141-14SU(*)A
MS51989E110-(*)	SF151-16SU(*)A
MS51989E111-(*)	SF161-18SU(*)A
MS51989E112-(*)	SF181-21SU(*)A
MS51989-103D(*)	SF81-6SA(*)
MS51989-104D(*)	SF91-7SA(*)
MS51989-105D(*)	SF101-9SA(*)
MS51989-106D(*)	SF111-11SA(*)
MS51989-107D(*)	SF121-12SA(*)
MS51989-108D(*)	SF131-13SA(*)
MS51989-109D(*)	SF141-14SA(*)
MS51989-110D(*)	SF151-16SA(*)
MS51989-111D(*)	SF161-18SA(*)
MS51989-112D(*)	SF181-21SA(*)
MS51989E103D(*)	SF81-6SU(*)
MS51989E104D(*)	SF91-7SU(*)
MS51989E105D(*)	SF101-9SU(*)
MS51989E106D(*)	SF111-11SU(*)
MS51989E107D(*)	SF121-12SU(*)
MS51989E108D(*)	SF131-13SU(*)
MS51989E109D(*)	SF141-14SU(*)
MS51989E110D(*)	SF151-16SU(*)
MS51989E111D(*)	SF161-18SU(*)
MS51989E112D(*)	SF181-21SU(*)

MS PART NUMBER	ROSÁN PART NUMBER
MS51989-202-(*)	SF72-4SA(*)A
MS51989-203-(*)	SF82-6SA(*)A
MS51989-204-(*)	SF92-7SA(*)A
MS51989-205-(*)	SF102-9SA(*)A
MS51989-206-(*)	SF112-11SA(*)A
MS51989-207-(*)	SF122-12SA(*)A
MS51989-208-(*)	SF132-13SA(*)A
MS51989-209-(*)	SF142-14SA(*)A
MS51989-210-(*)	SF152-16SA(*)A
MS51989-211-(*)	SF162-18SA(*)A
MS51989-212-(*)	SF182-21SA(*)A
MS51989E202-(*)	SF72-4SU(*)A
MS51989E203-(*)	SF82-6SU(*)A
MS51989E204-(*)	SF92-7SU(*)A
MS51989E205-(*)	SF102-9SU(*)A
MS51989E206-(*)	SF112-11SU(*)A
MS51989E207-(*)	SF122-12SU(*)A
MS51989E208-(*)	SF132-13SU(*)A
MS51989E209-(*)	SF142-14SU(*)A
MS51989E210-(*)	SF152-16SU(*)A
MS51989E211-(*)	SF162-18SU(*)A
MS51989E212-(*)	SF182-21SU(*)A
MS51989-203D(*)	SF82-6SA(*)
MS51989-204D(*)	SF92-7SA(*)
MS51989-205D(*)	SF102-9SA(*)
MS51989-206D(*)	SF112-11SA(*)
MS51989-207D(*)	SF122-12SA(*)
MS51989-208D(*)	SF132-13SA(*)
MS51989-209D(*)	SF142-14SA(*)
MS51989-210D(*)	SF152-16SA(*)
MS51989-211D(*)	SF162-18SA(*)
MS51989-212D(*)	SF182-21SA(*)
MS51989E203D(*)	SF82-6SU(*)
MS51989E204D(*)	SF92-7SU(*)
MS51989E205D(*)	SF102-9SU(*)
MS51989E206D(*)	SF112-11SU(*)
MS51989E207D(*)	SF122-12SU(*)
MS51989E208D(*)	SF132-13SU(*)
MS51989E209D(*)	SF142-14SU(*)
MS51989E210D(*)	SF152-16SU(*)
MS51989E211D(*)	SF162-18SU(*)
MS51989E212D(*)	SF182-21SU(*)

MS PART NUMBER	ROSÁN PART NUMBER
MS51989-302-(*)	SC71-4SA(*)A
MS51989-303-(*)	SC81-6SA(*)A
MS51989-304-(*)	SC91-7SA(*)A
MS51989-305-(*)	SC101-9SA(*)A
MS51989-306-(*)	SC111-11SA(*)A
MS51989-307-(*)	SC121-12SA(*)A
MS51989-308-(*)	SC131-13SA(*) A
MS51989-309-(*)	SC141-14SA(*)A
MS51989-310-(*)	SC151-16SA(*)A
MS51989-311-(*)	SC161-18SA(*)A
MS51989-312-(*)	SC181-21SA(*)A
MS51989E302-(*)	SC71-4SU(*)A
MS51989E303-(*)	SC81-6SU(*)A
MS51989E304-(*)	SC91-7SU(*)A
MS51989E305-(*)	SC101-9SU(*)A
MS51989E306-(*)	SC111-11SU(*)A
MS51989E307-(*)	SC121-12SU(*)A
MS51989E308-(*)	SC131-13SU(*)A
MS51989E309-(*)	SC141-14SU(*)A
MS51989E310-(*)	SC151-16SU(*)A
MS51989E311-(*)	SC161-18SU(*)A
MS51989E312-(*)	SC181-21SU(*)A
MS51989-303D(*)	SC81-6SA(*)
MS51989-304D(*)	SC91-7SA(*)
MS51989-305D(*)	SC101-9SA(*)
MS51989-306D(*)	SC111-11SA(*)
MS51989-307D(*)	SC121-12SA(*)
MS51989-308D(*)	SC131-13SA(*)
MS51989-309D(*)	SC141-14SA(*)
MS51989-310D(*)	SC151-16SA(*)
MS51989-311D(*)	SC161-18SA(*)
MS51989-312D(*)	SC181-21SA(*)
MS51989E303D(*)	SC81-6SU(*)
MS51989E304D(*)	SC91-7SU(*)
MS51989E305D(*)	SC101-9SU(*)
MS51989E306D(*)	SC111-11SU(*)
MS51989E307D(*)	SC121-12SU(*)
MS51989E308D(*)	SC131-13SU(*)
MS51989E309D(*)	SC141-14SU(*)
MS51989E310D(*)	SC151-16SU(*)
MS51989E311D(*)	SC161-18SU(*)
MS51989E312D(*)	SC181-21SU(*)

MS PART NUMBER	ROSÁN PART NUMBER
MS51989-402-(*)	SC72-4SA(*)A
MS51989-403-(*)	SC82-6SA(*)A
MS51989-404-(*)	SC92-7SA(*)A
MS51989-405-(*)	SC102-9SA(*)A
MS51989-406-(*)	SC112-11SA(*)A
MS51989-407-(*)	SC122-12SA(*)A
MS51989-408-(*)	SC132-13SA(*)A
MS51989-409-(*)	SC142-14SA(*)A
MS51989-410-(*)	SC152-16SA(*)A
MS51989-411-(*)	SC162-18SA(*)A
MS51989-412-(*)	SC182-21SA(*)A
MS51989E402-(*)	SC72-4SU(*)A
MS51989E403-(*)	SC82-6SU(*)A
MS51989E404-(*)	SC92-7SU(*)A
MS51989E405-(*)	SC102-9SU(*)A
MS51989E406-(*)	SC112-11SU(*)A
MS51989E407-(*)	SC122-12SU(*)A
MS51989E408-(*)	SC132-13SU(*)A
MS51989E409-(*)	SC142-14SU(*)A
MS51989E410-(*)	SC152-16SU(*)A
MS51989E411-(*)	SC162-18SU(*)A
MS51989E412-(*)	SC182-21SU(*)A
MS51989-403D(*)	SC82-6SA(*)
MS51989-404D(*)	SC92-7SA(*)
MS51989-405D(*)	SC102-9SA(*)
MS51989-406D(*)	SC112-11SA(*)
MS51989-407D(*)	SC122-12SA(*)
MS51989-408D(*)	SC132-13SA(*)
MS51989-409D(*)	SC142-14SA(*)
MS51989-410D(*)	SC152-16SA(*)
MS51989-411D(*)	SC162-18SA(*)
MS51989-412D(*)	SC182-21SA(*)
MS51989E403D(*)	SC82-6SU(*)
MS51989E404D(*)	SC92-7SU(*)
MS51989E405D(*)	SC102-9SU(*)
MS51989E406D(*)	SC112-11SU(*)
MS51989E407D(*)	SC122-12SU(*)
MS51989E408D(*)	SC132-13SU(*)
MS51989E409D(*)	SC142-14SU(*)
MS51989E410D(*)	SC152-16SU(*)
MS51989E411D(*)	SC162-18SU(*)
MS51989E412D(*)	SC182-21SU(*)

(*) Add dash number for nut end length. See Table V, page 5.

LOCKRINGS

MS PART NUMBER	ROSÁN PART NUMBER
MS51990-102P	RLRR16SB5
MS51990-103P	RLRR18SB6
MS51990-104P	RLRR21SB6
MS51990-105P	RLRR24SB7
MS51990-106P	RLRR28SB8
MS51990-107P	RLRR33SB9
MS51990-108P	RLRR38SB9
MS51990-109P	RLRR47SB10
MS51990-110P	RLRR56SB11
MS51990-111P	RLRR64SB11
MS51990-112P	RLRR72SB11
MS51990-113P	RLRR82SB12
MS51990-114P	RLRR90SB12

MS PART NUMBER	ROSÁN PART NUMBER
MS51990E102P	RLRR16SU5
MS51990E103P	RLRR18SU6
MS51990E104P	RLRR21SU6
MS51990E105P	RLRR24SU7
MS51990E106P	RLRR28SU8
MS51990E107P	RLRR33SU9
MS51990E108P	RLRR38SU9
MS51990E109P	RLRR47SU10
MS51990E110P	RLRR56SU11
MS51990E111P	RLRR64SU11
MS51990E112P	RLRR72SU11
MS51990E113P	RLRR82SU12
MS51990E114P	RLRR90SU12

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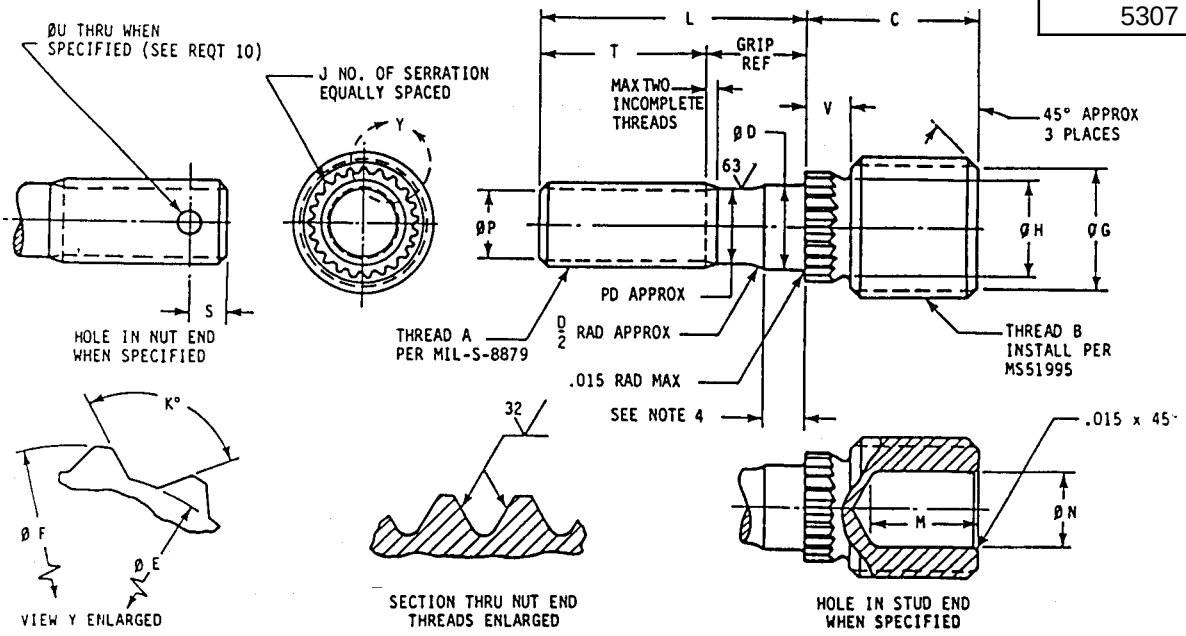

TABLE I - SHORT STUD END LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD			C	ØD	ØE	ØF	ØG	ØH	J	K°	M	ØN	T	V	ØP	S	ØU	LOCKRING MS51997 BASIC DASH NO.
		SEE REQT 4	PITCH DIA	MINOR DIA	±.020		+.005 -.004	+.007 -.002	+.000 -.015	MIN		+2° -1°	REF		±.015	±.015	±.010	±.015	+.005 -.002	
-502	.1900-32	.3125-24	.2884 .2869	.2643 .2559	.386	.189 .186	.203	.230	.255	.175	13	102°	.205	.174	.469	.128	.137	.120	.067	102P
-503	.2500-28	.3750-24	.3512 .3497	.3271 .3185	.486	.249 .246	.255	.284	.318	.233	17	86°	.281	.202	.594	.142	.190	.160	.067	103P
-504	.3125-24	.4375-20	.4084 .4067	.3795 .3700	.627	.312 .309	.316	.345	.370	.294	20	102°	.380	.205	.688	.176	.242	.160	.067	104P
-505	.3750-24	.5000-20	.4711 .4694	.4422 .4325	.762	.374 .371	.380	.407	.432	.357	24	102°	.480	.222	.750	.200	.305	.170	.096	105P
-506	.4375-20	.6250-18	.5927 .5910	.5606 .5498	.808	.437 .433	.456	.487	.549	.433	26	102°	.517	.324	.812	.200	.354	.170	.096	106P
-507	.5000-20	.7500-16	.7134 .7114	.6773 .6656	.883	.499 .495	.567	.601	.665	.535	26	111°	.563	.438	.875	.200	.416	.190	.096	107P
-508	.6250-18	.8750-14	.8328 .8308	.7916 .7786	1.153	.624 .620	.687	.721	.778	.645	30	111°	.773	.470	1.000	.255	.532	.220	.128	108P

TABLE II - MEDIUM STUD END LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD			C	ØD	ØE	ØF	ØG	ØH	J	K°	M	ØN	T	V	ØP	S	ØU	LOCKRING MS51997 BASIC DASH NO.
		SEE REQT 4	PITCH DIA	MINOR DIA	±.020		+.005 -.004	+.007 -.002	+.000 -.015	MIN		+2° -1°	REF		±.015	±.015	±.010	±.015	+.005 -.002	
-642	.1900-32	.3125-24	.2884 .2869	.2643 .2559	.433	.189 .186	.203	.230	.255	.175	13	102°	.252	.174	.469	.128	.137	.120	.067	102P
-643	.2500-28	.3750-24	.3512 .3497	.3271 .3185	.558	.249 .246	.255	.284	.318	.233	17	86°	.353	.202	.594	.142	.190	.160	.067	103P
-644	.3125-24	.4375-20	.4084 .4067	.3795 .3700	.725	.312 .309	.316	.345	.370	.294	20	102°	.478	.205	.688	.176	.242	.160	.067	104P
-645	.3750-24	.5000-20	.4711 .4694	.4422 .4325	.893	.374 .371	.380	.407	.432	.357	24	102°	.611	.222	.750	.200	.305	.170	.096	105P
-646	.4375-20	.6250-18	.5927 .5910	.5606 .5498	.948	.437 .433	.456	.487	.549	.433	26	102°	.657	.324	.812	.200	.354	.170	.096	106P
-647	.5000-20	.7500-16	.7134 .7114	.6773 .6656	1.038	.499 .495	.567	.601	.665	.535	26	111°	.718	.438	.875	.200	.416	.190	.096	107P
-648	.6250-18	.8750-14	.8328 .8308	.7916 .7786	1.364	.624 .620	.687	.721	.778	.645	30	111°	.984	.470	1.000	.255	.532	.220	.128	108P

P. A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		STUD, LOCKED IN - RING LOCKED, SERRATED, HIGH STRENGTH	MS51992
	99			
PROCUREMENT SPECIFICATION MIL-S-45909		SUPERSEDES:		PAGE 1 OF 3

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5307-0341

APPROVED 12 DEC 67 REVISEDA 7 APR 81 B 12 MAY 85

User activities:
Army - MI
Navy - MC, OS

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Army - AT, AV, GL, ME
Air Force - 11, 82
NSA - NS
DLA - IS

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TABLE III - LONG STUD END LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD SEE REQT 4	B PITCH DIA	B MINOR DIA	C ±.020	ØD	ØE +.005 -.004	ØF +.007 -.002	ØG +.000 -.015	ØH MIN	J	K° +2° -1°	M REF	ØN	T ±.015	V ±.015	ØP ±.010	S ±.015	ØU +.005 -.002	LOCKRING MS51997 BASIC DASH NO.
-802	.1900-32	.3125-18	.2795 .2778	.2474 .2373	.511	.189 .186	.203	.230	.237	.175	13	102°	.330	.148	.469	.128	.137	.120	.067	102P
-803	.2500-28	.3750-16	.3378 .3358	.3017 .2906	.673	.249 .246	.255	.284	.290	.233	17	86°	.468	.157	.594	.142	.190	.160	.067	103P
-804	.3125-24	.4375-14	.3946 .3926	.3534 .3411	.868	.312 .309	.316	.345	.341	.294	20	102°	.621	.153	.688	.176	.242	.160	.067	104P
-805	.3750-24	.5000-13	.4537 .4512	.4093 .3963	1.076	.374 .371	.380	.407	.396	.357	24	102°	.794	.148	.750	.200	.305	.170	.096	105P
-806	.4375-20	.6250-11	.5699 .5674	.5174 .5028	1.155	.437 .433	.456	.487	.502	.433	26	102°	.864	.239	.812	.200	.354	.170	.096	106P
-807	.5000-20	.7500-10	.6891 .6866	.6314 .6156	1.267	.499 .495	.567	.601	.615	.535	26	111°	.947	.369	.875	.200	.416	.190	.096	107P
-808	.6250-18	.8750-9	.8071 .8046	.7430 .7257	1.656	.624 .620	.687	.721	.725	.645	30	111°	1.276	.378	1.000	.255	.532	.220	.128	108P

REQUIREMENTS:

1. MATERIAL:

CODE LETTER
A - Steel, alloy, Grade 8740 (UNS G87400) conforming to MIL-S-6049 or AMS 6322.
B - Steel, alloy, Grade 8740 (UNS G87400) conforming to MIL-S-6049 or AMS 6322.
C - Steel, corrosion and heat resistant, Type A286 (UNS S66286) conforming to AMS 5731 or AMS 5734.
D - Nickel base alloy, corrosion and heat resistant, Type 718 (UNS N07718) conforming to AMS 5662.
E - Titanium alloy, Ti-6A1-4V (UNS R56400) conforming to MIL-T-9047, Ti-6A1-4V, condition A or AMS 4967.

2. PROTECTIVE COATING OR TREATMENT:

MATERIAL CODE LETTER
A - Cadmium plated in accordance with QQ-P-416, Type II, class 3.
B - Cadmium plated in accordance with AMS 2401.
C & D - Cleaned, descaled and passivated in accordance with ASTM A380.
E - None.

3. SURFACE ROUGHNESS: Unless otherwise specified, machined surfaces shall be 125 microinches in accordance with ANSI B46.1 except for serrated collar.

4. THREADS: The stud end thread has a special pitch diameter and minor diameter which installs into a MIL-S-8879, Class 3B tapped hole. Threads shall be in accordance with procurement specification.

5. MECHANICAL PROPERTIES: Material code letters and corresponding hardness, tensile strengths and pertinent length dash numbers follow:

Material Code Letters	Hardness Min	Min Tensile Strength KSI	Dash Numbers
A	35HRC	160	-642 thru -648 & -802 thru -808
B	39HRC	180	-502 thru -508
C	277HB	140	-502 thru -508, -642 thru -648 & -802 thru -808
D	39HRC	180	-502 thru -508
E	35HRC	160	-502 thru -508, -642 thru -648 & -802 thru -808

6. CONCENTRICITY: Shank of nut end shall be concentric with serrated collar within .006 FIM.

7. FILLETS: Fillets shall be .030 radius maximum.

8. EDGES: Edges broken .003-.015 unless otherwise specified.

9. TOLERANCES: Linear dimensions ±.005, angular dimensions ±2°.

10. PART NUMBER: The MS part number consists of the MS number, plus the material code letter, plus the dash number, plus the second dash number for length (table IV). Add "D" in lieu of the "dash" for drilled hole in nut end. Add "R" as suffix for recess in stud end. EXAMPLE:
MS51992 A 803-24 Stud, Alloy Steel, 1.5 inch nut end length.
MS51992 B 503-24 Stud, Alloy Steel, 1.5 inch nut end length.
MS51992 C 643-24 Stud, Cres, 1.5 inch nut end length.
MS51992 D 503-24 Stud, Nickel Base Alloy, 1.5 inch nut end length.
MS51992 E 803-24 Stud, Titanium Alloy, 1.5 inch nut end length.
* MS51992 A 803D24 Stud, Alloy Steel, drilled hole, 1.5 inch nut end length.
* MS51992 A 803D24R Stud, Alloy Steel, drilled hole, recess in stud end, 1.5 inch nut end length.
* The same condition(s) can exist for all of the above materials.

NOTES:

1. DIMENSIONS: Dimensions in inches; to be met after plating.
2. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.
3. Referenced Government (or non-government) documents of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

APPROVED 12 DEC 67 REVISED B FOR CHANGES, SEE PAGES 1, 2 AND 3

User activities:
Army - MI
Navy - MC, OS

Review activities:
Army - AT, AV, GL, ME
Air Force - 11, 82
NSA - NS
DLA - IS

P. A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		STUD, LOCKED IN - RING LOCKED, SERRATED, HIGH STRENGTH	MS51992
	99			
PROCUREMENT SPECIFICATION MIL-S-45909		SUPERSEDES:		PAGE 2 OF 3

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5307-0341

User activities:
Army - MI
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Army - AT, AV, GL, ME
Air Force - 11, 82
NSA - NS
DLA - IS

TABLE IV
TABULATED LENGTHS (NUT END)

DASH NO.	L ±.015 NUT END	GRIP LENGTH, REF (APPLICABLE TO TABLES I, II AND III) UNJF SERIES 3A THREADS						
		.1900	.2500	.3125	.3750	.4375	.5000	.6250
-8	.500	*						
-9	.562	.093	*					
-10	.625	.156	*					
-11	.688	.219	*	*				
-12	.750	.281	.156	*	*			
-13	.812	.343	.218	.124	*			
-14	.875	.406	.281	.187	.125			
-15	.938	.469	.344	.250	.188	*		
-16	1.000	.531	.406	.312	.250	.188	*	
-17	1.062	.593	.468	.374	.312	.250	.187	
-18	1.125	.656	.531	.437	.375	.313	.250	*
-19	1.188	.719	.594	.500	.438	.376	.313	.188
-20	1.250	.781	.656	.562	.500	.438	.375	.250
-21	1.312	.843	.718	.624	.562	.500	.437	.312
-22	1.375	.906	.781	.687	.625	.563	.500	.375
-23	1.438	.969	.844	.750	.688	.626	.563	.438
-24	1.500	1.031	.906	.812	.750	.688	.625	.500
-25	1.562	1.093	.968	.874	.812	.750	.687	.562
-26	1.625	1.156	1.031	.937	.875	.813	.750	.625
-27	1.688	1.219	1.094	1.000	.938	.876	.813	.688
-28	1.750	1.281	1.156	1.062	1.000	.938	.875	.750
-29	1.812	1.343	1.218	1.124	1.062	1.000	.937	.812
-30	1.875	1.406	1.281	1.187	1.125	1.063	1.000	.875
-31	1.938	1.469	1.344	1.250	1.188	1.126	1.063	.938
-32	2.000	1.531	1.406	1.312	1.250	1.188	1.125	1.000
-34	2.125	1.656	1.531	1.437	1.375	1.313	1.250	1.125
-36	2.250	1.781	1.656	1.562	1.500	1.438	1.375	1.250
-38	2.375	1.906	1.781	1.687	1.625	1.563	1.500	1.375
-40	2.500	2.031	1.906	1.812	1.750	1.688	1.625	1.500
-42	2.625	2.156	2.031	1.937	1.875	1.813	1.750	1.625
-44	2.750	2.281	2.156	2.062	2.000	1.938	1.875	1.750
-46	2.875	2.406	2.281	2.187	2.125	2.063	2.000	1.875
-48	3.000	2.531	2.406	2.312	2.250	2.188	2.125	2.000
-50	3.125	2.656	2.531	2.437	2.375	2.313	2.250	2.125
-52	3.250	2.781	2.656	2.562	2.500	2.438	2.375	2.250
-54	3.375	2.906	2.781	2.687	2.625	2.563	2.500	2.375
-56	3.500	3.031	2.906	2.812	2.750	2.688	2.625	2.500
-58	3.625	3.156	3.031	2.937	2.875	2.813	2.750	2.625
-60	3.750	3.281	3.156	3.062	3.000	2.938	2.875	2.750
-62	3.875	3.406	3.281	3.187	3.125	3.063	3.000	2.875
-64	4.000	3.531	3.406	3.312	3.250	3.188	3.125	3.000

*HAS NO "D" SHANK AND "T" DIMENSION IS REDUCED. "T" DIMENSION WILL TERMINATE WITHIN 3 PITCHES OF SERRATED COLLAR.

NOTES: CONTINUED

4. DASH NUMBER PARTS BELOW HEAVY LINE HAVE LENGTH OF SHANK D EQUAL TO $\frac{D(MAX)}{2}$

DASH NUMBER PARTS ABOVE HEAVY LINE HAVE LENGTH OF SHANK D SHORTER THAN $\frac{D(MAX)}{2}$

APPROVED 12 DEC 67 REVISEDB FOR CHANGES, SEE PAGES 1, 2 AND 3

P. A. AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust AS		STUD, LOCKED IN - RING LOCKED, SERRATED, HIGH STRENGTH	MS51992
99			
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES:		PAGE 3 OF 3

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5307-0341

TOOLING FOR MS51992 STUDS

STUD DASH NUMBER MS51992	STEP DRILL [1]	WRENCH	LOCKRING DRIVE TOLL	REMOVAL TOOL [2]
-802	SDC328JC	R1104W	SF5902-2D	SM91-16
-502	SDC328JF			
-642	SDC328JF			
-803	SDC390JC	R1105W	SF5902-3D	SM101-18
-503	SDC390JF			
-643	SDC390JF			
-804	SDC453JC	R1106W	SF5902-4D	BT1575
-504	SDC453JF			
-644	SDC453JF			
-805	SDC515JC	R1107XW	SF5902-5D	BT308
-505	SDC515JF			
-645	SDC515JF			
-806	SDC625JC	R1108W	SF5902-6D	BT1567
-506	SDC625JF			
-646	SDC625JF			
-807	SDC750JC	R1110W	SF5902-7D	BT1568
-507	SDC750JF			
-647	SDC750JF			
-808	SDC875JC	R1111W	SF5902-8D	SM161-30
-508	SDC875JF			
-648	SDC875JF			

NOTES: UNLESS OTHERWISE SPECIFIED

[1] Step drills are designed for thru hole drilling. When used to drill a blind hole, it may be necessary to grind the drill to suit the depth required.

[2] See page 27 for removal instructions.

INTERCHANGEABILITY TABLES
MS VERSUS ROSÁN

STUDS

MS PART NUMBER	ROSÁN PART NUMBER
MS51992A642-8	SFT5902A642-8
MS51992A642-(9 thru 64)	SF5902A642-(9 thru 64)
MS51992A643-9	SFT5902A643-9
MS51992A643-10	SFT5902A643-10
MS51992A643-11	SFT5902A643-11
MS51992A643-(12 thru 64)	SF5902A643-(12 thru 64)
MS51992A644-11	SFT5902A644-11
MS51992A644-12	SFT5902A644-12
MS51992A644-(13 thru 64)	SF5902A644-(13 thru 64)
MS51992A645-12	SFT5902A645-12
MS51992A645-13	SFT5902A645-13
MS51992A645-(14 thru 64)	SF5902A645-(14 thru 64)
MS51992A646-15	SFT5902A646-15
MS51992A646-(16 thru 64)	SF5902A646-(16 thru 64)
MS51992A647-16	SFT5902A647-16
MS51992A647-(17 thru 64)	SF5902A647-(17 thru 64)
MS51992A648-18	SFT5902A648-18
MS51992A648-(19 thru 64)	SF5902A648-(19 thru 64)
MS51992A802-8	SFT5902A802-8
MS51992A802-(9 thru 64)	SF5902A802-(9 thru 64)
MS51992A803-9	SFT5902A803-9
MS51992A803-10	SFT5902A803-10
MS51992A803-11	SFT5902A803-11
MS51992A803-(12 thru 64)	SF5902A803-(12 thru 64)
MS51992A804-11	SFT5902A804-11
MS51992A804-12	SFT5902A804-12
MS51992A804-(13 thru 64)	SF5902A804-(13 thru 64)
MS51992A805-12	SFT5902A805-12
MS51992A805-13	SFT5902A805-13
MS51992A805-(14 thru 64)	SF5902A805-(14 thru 64)
MS51992A806-15	SFT5902A806-15
MS51992A806-(16 thru 64)	SF5902A806-(16 thru 64)
MS51992A807-16	SFT5902A807-16
MS51992A807-(17 thru 64)	SF5902A807-(17 thru 64)
MS51992A808-18	SFT5902A808-18
MS51992A808-(19 thru 64)	SF5902A808-(19 thru 64)
MS51992B502-8	SFT5902B502-8
MS51992B502-(9 thru 64)	SF5902B502-(9 thru 64)
MS51992B503-9	SFT5902B503-9
MS51992B503-10	SFT5902B503-10
MS51992B503-11	SFT5902B503-11
MS51992B503-(12 thru 64)	SF5902B503-(12 thru 64)
MS51992B504-11	SFT5902B504-11
MS51992B504-12	SFT5902B504-12
MS51992B504-(13 thru 64)	SF5902B504-(13 thru 64)
MS51992B505-12	SFT5902B505-12
MS51992B505-13	SFT5902B505-13
MS51992B505-(14 thru 64)	SF5902B505-(14 thru 64)
MS51992B506-15	SFT5902B506-15
MS51992B506-(16 thru 64)	SF5902B506-(16 thru 64)
MS51992B507-16	SFT5902B507-16
MS51992B507-(17 thru 64)	SF5902B507-(17 thru 64)
MS51992B508-18	SFT5902B508-18
MS51992B508-(19 thru 64)	SF5902B508-(19 thru 64)

MS PART NUMBER	ROSÁN PART NUMBER
MS51992C502-8	SFT5902C502-8
MS51992C502-(9 thru 64)	SF5902C502-(9 thru 64)
MS51992C503-9	SFT5902C503-9
MS51992C503-10	SFT5902C503-10
MS51992C503-11	SFT5902C503-11
MS51992C503-(12 thru 64)	SF5902C503-(12 thru 64)
MS51992C504-11	SFT5902C504-11
MS51992C504-12	SFT5902C504-12
MS51992C504-(13 thru 64)	SF5902C504-(13 thru 64)
MS51992C505-12	SFT5902C505-12
MS51992C505-13	SFT5902C505-13
MS51992C505-(14 thru 64)	SF5902C505-(14 thru 64)
MS51992C506-15	SFT5902C506-15
MS51992C506-(16 thru 64)	SF5902C506-(16 thru 64)
MS51992C507-16	SFT5902C507-16
MS51992C507-(17 thru 64)	SF5902C507-(17 thru 64)
MS51992C508-18	SFT5902C508-18
MS51992C508-(19 thru 64)	SF5902C508-(19 thru 64)
MS51992C642-8	SFT5902C642-8
MS51992C642-(9 thru 64)	SF5902C642-(9 thru 64)
MS51992C643-9	SFT5902C643-9
MS51992C643-10	SFT5902C643-10
MS51992C643-11	SFT5902C643-11
MS51992C643-(12 thru 64)	SF5902C643-(12 thru 64)
MS51992C644-11	SFT5902C644-11
MS51992C644-12	SFT5902C644-12
MS51992C644-(13 thru 64)	SF5902C644-(13 thru 64)
MS51992C645-12	SFT5902C645-12
MS51992C645-13	SFT5902C645-13
MS51992C645-(14 thru 64)	SF5902C645-(14 thru 64)
MS51992C646-15	SFT5902C646-15
MS51992C646-(16 thru 64)	SF5902C646-(16 thru 64)
MS51992C647-16	SFT5902C647-16
MS51992C647-(17 thru 64)	SF5902C647-(17 thru 64)
MS51992C648-18	SFT5902C648-18
MS51992C648-(19 thru 64)	SF5902C648-(19 thru 64)
MS51992C802-8	SFT5902C802-8
MS51992C802-(9 thru 64)	SF5902C802-(9 thru 64)
MS51992C803-9	SFT5902C803-9
MS51992C803-10	SFT5902C803-10
MS51992C803-11	SFT5902C803-11
MS51992C803-(12 thru 64)	SF5902C803-(12 thru 64)
MS51992C804-11	SFT5902C804-11
MS51992C804-12	SFT5902C804-12
MS51992C804-(13 thru 64)	SF5902C804-(13 thru 64)
MS51992C805-12	SFT5902C805-12
MS51992C805-13	SFT5902C805-13
MS51992C805-(14 thru 64)	SF5902C805-(14 thru 64)
MS51992C806-15	SFT5902C806-15
MS51992C806-(16 thru 64)	SF5902C806-(16 thru 64)
MS51992C807-16	SFT5902C807-16
MS51992C807-(17 thru 64)	SF5902C807-(17 thru 64)
MS51992C808-18	SFT5902C808-18
MS51992C808-(19 thru 64)	SF5902C808-(19 thru 64)

INTERCHANGEABILITY TABLES
MS VERSUS ROSÁN

STUDS

MS PART NUMBER	ROSÁN PART NUMBER
MS51992D502-8	SFT5902D502-8
MS51992D502-(9 thru 64)	SF5902D502-(9 thru 64)
MS51992D503-9	SFT5902D503-9
MS51992D503-10	SFT5902D503-10
MS51992D503-11	SFT5902D503-11
MS51992D503-(12 thru 64)	SF5902D503-(12 thru 64)
MS51992D504-11	SFT5902D504-11
MS51992D504-12	SFT5902D504-12
MS51992D504-(13 thru 64)	SF5902D504-(13 thru 64)
MS51992D505-12	SFT5902D505-12
MS51992D505-13	SFT5902D505-13
MS51992D505-(14 thru 64)	SF5902D505-(14 thru 64)
MS51992D506-15	SFT5902D506-15
MS51992D506-(16 thru 64)	SF5902D506-(16 thru 64)
MS51992D507-16	SFT5902D507-16
MS51992D507-(17 thru 64)	SF5902D507-(17 thru 64)
MS51992D508-18	SFT5902D508-18
MS51992D508-(19 thru 64)	SF5902D508-(19 thru 64)
MS51992E502-8	SFT5902E502-8
MS51992E502-(9 thru 64)	SF5902E502-(9 thru 64)
MS51992E503-9	SFT5902E503-9
MS51992E503-10	SFT5902E503-10
MS51992E503-11	SFT5902E503-11
MS51992E503-(12 thru 64)	SF5902E503-(12 thru 64)
MS51992E504-11	SFT5902E504-11
MS51992E504-12	SFT5902E504-12
MS51992E504-(13 thru 64)	SF5902E504-(13 thru 64)
MS51992E505-12	SFT5902E505-12
MS51992E505-13	SFT5902E505-13
MS51992E505-(14 thru 64)	SF5902E505-(14 thru 64)
MS51992E506-15	SFT5902E506-15
MS51992E506-(16 thru 64)	SF5902E506-(16 thru 64)
MS51992E507-16	SFT5902E507-16
MS51992E507-(17 thru 64)	SF5902E507-(17 thru 64)
MS51992E508-18	SFT5902E508-18
MS1992E508-(19 thru 64)	SF5902E508-(19 thru 64)
MS51992E642-8	SFT5902E642-8
MS51992E642-(9 thru 64)	SF5902E642-(9 thru 64)
MS51992E643-9	SFT5902E643-9
MS51992E643-10	SFT5902E643-10
MS51992E643-11	SFT5902E643-11
MS51992E643-(12 thru 64)	SF5902E643-(12 thru 64)
MS51992E644-11	SFT5902E644-11
MS51992E644-12	SFT5902E644-12
MS51992E644-(13 thru 64)	SF5902E644-(13 thru 64)
MS51992E645-12	SFT5902E645-12
MS51992E645-13	SFT5902E645-13
MS51992E645-(14 thru 64)	SF5902E645-(14 thru 64)
MS51992E646-15	SFT5902E646-15
MS51992E646-(16 thru 64)	SF5902E646-(16 thru 64)
MS51992E647-16	SFT5902E647-16
MS51992E647-(17 thru 64)	SF5902E647-(17 thru 64)
MS51992E648-18	SFT5902E648-18
MS51992E648-(19 thru 64)	SF5902E648-(19 thru 64)

MS PART NUMBER	ROSÁN PART NUMBER
MS51992E802-8	SFT5902E802-8
MS51992E802-(9 thru 64)	SF5902E802-(9 thru 64)
MS51992E803-9	SFT5902E803-9
MS51992E803-10	SFT5902E803-10
MS51992E803-11	SFT5902E803-11
MS51992E803-(12 thru 64)	SF5902E803-(12 thru 64)
MS51992E804-11	SFT5902E804-11
MS5199204-12	SFT5902E804-12
MS51992E804-(13 thru 64)	SF5902E804-(13 thru 64)
MS51992E805-12	SFT5902E805-12
MS51992E805-13	SFT5902E805-13
MS51992E805-(14 thru 64)	SF5902E805-(14 thru 64)
MS51992E806-15	SFT5902E806-15
MS51992E806-(16 thru 64)	SF5902E806-(16 thru 64)
MS51992E807-16	SFT5902E807-16
MS51992E80W(17 thru 64)	SF5902E807-(17 thru 64)
MS51992E808-18	SFT5902E808-18
MS51992E808-(19 thru 64)	SF5902E808-(19 thru 64)

LOCKRINGS

MS PART NUMBER	ROSÁN PART NUMBER
MS51997-102P	RLRR1997-102
MS51997-103P	RLRR1997-103
MS51997-104P	RLRR1997-104
MS51997-105P	RLRR1997-105
MS51997-106P	RLRR1997-106
MS51997-107P	RLRR1997-107
MS51997-108P	RLRR1997-108
MS51997-109P	RLRR1997-109
MS51997E102P	RLRR1997E102
MS51997E103P	RLRR1997E103
MS51997E104P	RLRR1997E104
MS51997E105P	RLRR1997E105
MS51997E106P	RLRR1997E106
MS51997E107P	RLRR1997E107
MS51997E108P	RLRR1997E108
MS51997E109P	RLRR1997E109

NOTES: UNLESS OTHERWISE SPECIFIED
1. For nut end length, see table IV, page 14.

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5307

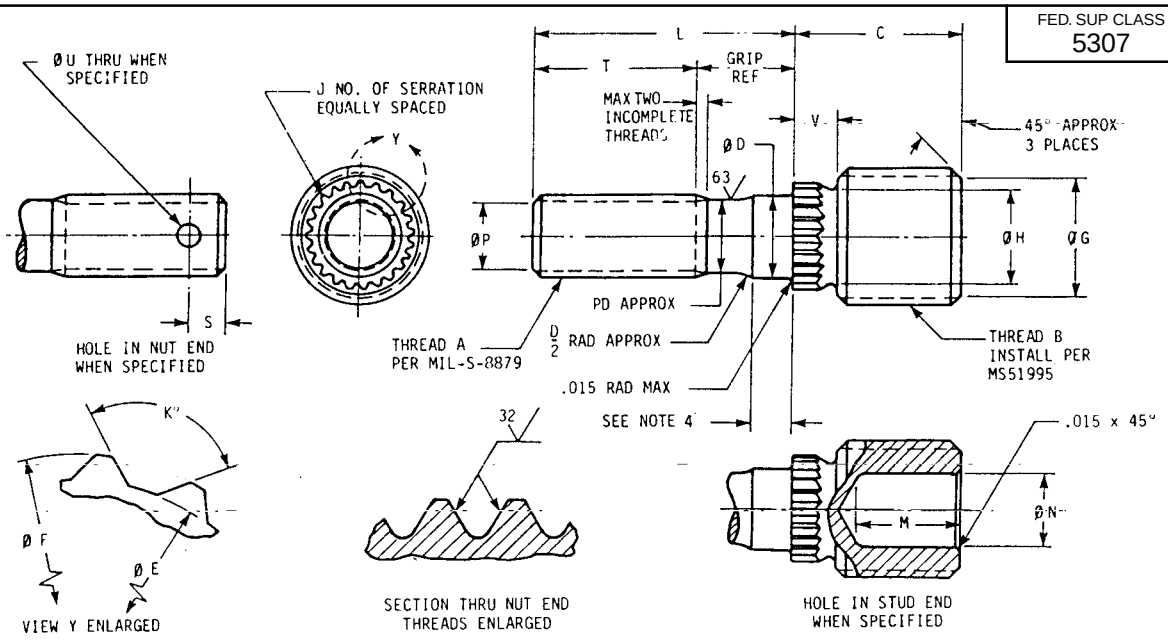


TABLE I - SHORT LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD			C	ØD	ØE	ØF	ØG	ØH	J	K°	M	ØN	T	V	ØP	S	ØU	LOCK RING MS51997 BASIC DASH
		SEE REQT 4	PITCH DIA	MINOR DIA	±.020		+.005 -.004	+.007 -.002	+.000 -.015	MIN		+2° -1°	REF		±.015	±.015	±.010	±.015	+.005 -.002	
-502	.1900-32	.3750-24	.3512 .3497	.3271 .3185	.386	.189 .186	.255	.284	.318	.233	17	86°	.181	.202	.469	.142	.137	.120	.067	103P
-503	.2500-28	.4375-20	.4084 .4067	.3795 .3700	.486	.249 .246	.316	.345	.370	.294	20	102°	.239	.205	.594	.155	.190	.160	.067	104P
-504	.3125-24	.5000-20	.4711 .4694	.4422 .4325	.627	.312 .309	.380	.407	.432	.357	24	102°	.345	.222	.688	.200	.242	.160	.067	105P
-505	.3750-24	.6250-18	.5927 .5910	.5606 .5498	.762	.374 .371	.456	.487	.549	.433	26	102°	.471	.324	.750	.200	.305	.170	.096	106P
-506	.4375-20	.7500-16	.7134 .7114	.6773 .6656	.808	.437 .433	.567	.601	.665	.535	26	111°	.488	.438	.812	.200	.354	.170	.096	107P
-507	.5000-20	.8750-14	.8328 .8308	.7916 .7786	.883	.499 .495	.687	.721	.778	.645	30	111°	.503	.470	.875	.255	.416	.190	.096	108P
-508	.6250-18	1.0000-12	.9503 .9478	.9022 .8878	1.153	.624 .620	.783	.820	.887	.741	30	111°	.728	.476	1.000	.255	.532	.220	.128	109P

TABLE II - MEDIUM LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD			C	ØD	ØE	ØF	ØG	ØH	J	K°	M	ØN	T	V	ØP	S	ØU	LOCK RING MS51997 BASIC DASH
		SEE REQT 4	PITCH DIA	MINOR DIA	±.020		+.005 -.004	+.007 -.002	+.000 -.015	MIN		+2° -1°	REF		±.015	±.015	±.010	±.015	+.005 -.002	
-642	.1900-32	.3750-24	.3512 .3497	.3271 .3185	.433	.189 .186	.255	.284	.318	.233	17	86°	.226	.202	.469	.142	.137	.120	.067	103P
-643	.2500-28	.4375-20	.4084 .4067	.3795 .3700	.558	.249 .246	.316	.345	.370	.294	20	102°	.311	.205	.594	.155	.190	.160	.067	104P
-644	.3125-24	.5000-20	.4711 .4694	.4422 .4325	.725	.312 .309	.380	.407	.432	.357	24	102°	.443	.222	.688	.200	.242	.160	.067	105P
-645	.3750-24	.6250-18	.5927 .5910	.5606 .5498	.893	.374 .371	.456	.487	.549	.433	26	102°	.602	.324	.750	.200	.305	.170	.096	106P
-646	.4375-20	.7500-16	.7134 .7114	.6773 .6656	.948	.437 .433	.567	.601	.665	.535	26	111°	.628	.438	.812	.200	.354	.170	.096	107P
-647	.5000-20	.8750-14	.8328 .8308	.7916 .7786	1.038	.499 .495	.687	.721	.778	.645	30	111°	.658	.470	.875	.255	.416	.190	.096	108P
-648	.6250-18	1.0000-12	.9503 .9478	.9022 .8878	1.364	.624 .620	.783	.820	.887	.741	30	111°	.939	.476	1.000	.255	.532	.220	.128	109P

APPROVED 11 MAR 85 REVISED

User activities:
Army - MI
Navy - MC, OS

Review activities:
Army - AT, AV, GL, ME
Air Force - 11, 82
NSA - NS
DLA - IS

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.

P. A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		STUD, LOCKED IN-RING LOCKED, SERRATED, HIGH STRENGTH, OVERSIZE REPLACER	MS51497
	99			
PROCUREMENT SPECIFICATION NONE			SUPERSEDES:	PAGE 1 OF 3

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5307-0339

FED. SUP CLASS
5307

TABLE III - LONG LENGTH

DASH NO.	A NUT END THREAD UNJF - 3A	B STUD END THREAD SEE REQT 4	B PITCH DIA	B MINOR DIA	C ±.020	ØD	ØE +.005 -.004	ØF +.007 -.002	ØG +.000 -.015	ØH MIN	J	K° +2° -1°	M REF	ØN	T ±.015	V ±.015	ØP ±.010	S ±.015	ØU +.005 -.002	LOCKRING MS51997 BASIC DASH NO.
-802	.1900-32	.3750-24	.3512	.3271	.511	.189	.255	.284	.318	.233	17	86°	.339	.202	.469	.142	.137	.120	.067	103P
			.3497	.3185		.186														
-802	.1900-32	.3750-24	.3512	.3271	.511	.189	.255	.284	.318	.233	17	86°	.339	.202	.469	.142	.137	.120	.067	103P
			.3497	.3185		.186														
-803	.2500-28	.4375-20	.4084	.3795	.673	.249	.316	.345	.370	.294	20	102°	.465	.205	.594	.155	.190	.160	.067	104P
			.4067	.3700		.246														
-804	.3125-24	.5000-20	.4711	.4422	.868	.312	.380	.407	.432	.357	24	102°	.617	.222	.688	.200	.242	.160	.067	105P
			.4694	.4325		.309														
-805	.3750-24	.6250-18	.5927	.5606	1.076	.374	.456	.487	.549	.433	26	102°	.828	.324	.750	.200	.305	.170	.096	106P
			.5910	.5498		.371														
-806	.4375-20	.7500-16	.7134	.6773	1.155	.437	.567	.601	.665	.535	26	111°	.835	.438	.812	.200	.354	.170	.096	107P
			.7114	.6656		.433														
-807	.5000-20	.8750-14	.8328	.7916	1.267	.499	.687	.721	.788	.645	30	111°	.928	.470	.875	.255	.416	.190	.096	108P
			.8308	.7786		.495														
-808	.6250-18	1.000-12	.9503	.9022	1.656	.624	.783	.820	.887	.741	30	111°	1.231	.476	1.000	.255	.532	.220	.128	109P
			.9478	.8878		.620														

REQUIREMENTS:

1. MATERIAL:
CODE LETTER
A - Steel, alloy, Grade 8740 (UNS G87400) conforming to MIL-S-6049 or AMS 6322.
B - Steel, alloy, Grade 8740 (UNS G87400) conforming to MIL-S-6049 or AMS 6322.
C - Steel, corrosion and heat resistant, Type A286 (UNS S66286) conforming to AMS 5731 or AMS 5734.
D - Nickel base alloy, corrosion and heat resistant, Type 718 (UNS N07718) conforming to AMS 5662.
E - Titanium alloy, Ti-6A1-4V (UNS R56400) conforming to MIL-T-9047, Ti-6A1-4V, condition A or AMS 4967.

2. PROTECTIVE COATING OR TREATMENT:
MATERIAL CODE LETTER
A - Cadmium plated in accordance with QQ-P-416, Type II, class 3.
B - Cadmium plated in accordance with AMS 2401.
C & D - Cleaned, descaled and passivated in accordance with ASTM A380.
E - None.

3. SURFACE ROUGHNESS: Unless otherwise specified, machined surfaces shall be 125 microinches in accordance with ANSI B46.1 except for serrated collar.

4. THREADS: The stud end thread has a special pitch diameter and minor diameter which installs into a MIL-S-8879, Class 3B tapped hole. Threads shall be in accordance with procurement specification.

5. MECHANICAL PROPERTIES: Material code letters and corresponding hardness, tensile strengths and pertinent length dash numbers follow:

Material Code Letters	Hardness Min	Min Tensile Strength KSI	Dash Numbers
A	35HRC	160	-642 thru -648 & -802 thru -808
B	39HRC	180	-502 thru -508
C	277HB	140	-502 thru -508, -642 thru -648 & -802 thru -808
D	39HRC	180	-502 thru -508
E	35HRC	160	-502 thru -508, -642 thru -648 & -802 thru -808

6. CONCENTRICITY: Shank of nut end shall be concentric with serrated collar within .006 FIM.

7. FILLETS: Fillets shall be .030 radius maximum.

8. EDGES: Edges broken .003-.015 unless otherwise specified.

9. TOLERANCES: Linear dimensions ±.005, angular dimensions ±2°.

10. PART NUMBER: The MS part number consists of the MS number, plus the material code letter, plus the dash number, plus the second dash number for length (table IV). Add "D" in lieu of the "dash" for drilled hole in nut end. Add "R" as suffix for recess in stud end. EXAMPLE:
MS51992 A 803-24 Stud, Alloy Steel, 1.5 inch nut end length.
MS51992 B 503-24 Stud, Alloy Steel, 1.5 inch nut end length.
MS51992 C 643-24 Stud, Cres, 1.5 inch nut end length.
MS51992 D 503-24 Stud, Nickel Base Alloy, 1.5 inch nut end length.
MS51992 E 803-24 Stud, Titanium Alloy, 1.5 inch nut end length.
* MS51992 A 803D24 Stud, Alloy Steel, drilled hole, 1.5 inch nut end length.
* MS51992 A 803D24R Stud, Alloy Steel, drilled hole, recess in stud end, 1.5 inch nut end length.
* The same condition(s) can exist for all of the above materials.

NOTES:
1. DIMENSIONS: Dimensions in inches; to be met after plating.
2. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.
3. Referenced Government (or non-government) documents of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

APPROVED 11 MAR 85 REVISED

P.A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		STUD, LOCKED IN - RING LOCKED, SERRATED, HIGH STRENGTH OVERSIZE REPLACER	MS51497
	99			
PROCUREMENT SPECIFICATION: MIL-S-45909		SUPERSEDES: –		SHEET 3 OF 3

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5307-0341

TABLE IV
TABULATED LENGTHS (NUT END)

DASH NO.	L ±.015 NUT END	GRIP LENGTH, REF (APPLICABLE TO TABLES I, II AND III) UNJF SERIES 3A THREADS						
		.1900	.2500	.3125	.3750	.4375	.5000	.6250
-8	.500	*						
-9	.562	.093	*					
-10	.625	.156	*					
-11	.688	.219	*	*				
-12	.750	.281	.156	*	*			
-13	.812	.343	.218	.124	*			
-14	.875	.406	.281	.187	.125			
-15	.938	.469	.344	.250	.188	*		
-16	1.000	.531	.406	.312	.250	.188	*	
-17	1.062	.593	.468	.374	.312	.250	.187	
-18	1.125	.656	.531	.437	.375	.313	.250	*
-19	1.188	.719	.594	.500	.438	.376	.313	.188
-20	1.250	.781	.656	.562	.500	.438	.375	.250
-21	1.312	.843	.718	.624	.562	.500	.437	.312
-22	1.375	.906	.781	.687	.625	.563	.500	.375
-23	1.438	.969	.844	.750	.688	.626	.563	.438
-24	1.500	1.031	.906	.812	.750	.688	.625	.500
-25	1.562	1.093	.968	.874	.812	.750	.687	.562
-26	1.625	1.156	1.031	.937	.875	.813	.750	.625
-27	1.688	1.219	1.094	1.000	.938	.876	.813	.688
-28	1.750	1.281	1.156	1.062	1.000	.938	.875	.750
-29	1.812	1.343	1.218	1.124	1.062	1.000	.937	.812
-30	1.875	1.406	1.281	1.187	1.125	1.063	1.000	.875
-31	1.938	1.469	1.344	1.250	1.188	1.126	1.063	.938
-32	2.000	1.531	1.406	1.312	1.250	1.188	1.125	1.000
-34	2.125	1.656	1.531	1.437	1.375	1.313	1.250	1.125
-36	2.250	1.781	1.656	1.562	1.500	1.438	1.375	1.250
-38	2.375	1.906	1.781	1.687	1.625	1.563	1.500	1.375
-40	2.500	2.031	1.906	1.812	1.750	1.688	1.625	1.500
-42	2.625	2.156	2.031	1.937	1.875	1.813	1.750	1.625
-44	2.750	2.281	2.156	2.062	2.000	1.938	1.875	1.750
-46	2.875	2.406	2.281	2.187	2.125	2.063	2.000	1.875
-48	3.000	2.531	2.406	2.312	2.250	2.188	2.125	2.000
-50	3.125	2.656	2.531	2.437	2.375	2.313	2.250	2.125
-52	3.250	2.781	2.656	2.562	2.500	2.438	2.375	2.250
-54	3.375	2.906	2.781	2.687	2.625	2.563	2.500	2.375
-56	3.500	3.031	2.906	2.812	2.750	2.688	2.625	2.500
-58	3.625	3.156	3.031	2.937	2.875	2.813	2.750	2.625
-60	3.750	3.281	3.156	3.062	3.000	2.938	2.875	2.750
-62	3.875	3.406	3.281	3.187	3.125	3.063	3.000	2.875
-64	4.000	3.531	3.406	3.312	3.250	3.188	3.125	3.000

*HAS NO "D" SHANK AND "T" DIMENSION IS REDUCED. "T" DIMENSION WILL TERMINATE WITHIN 3 PITCHES OF SERRATED COLLAR.

NOTES: CONTINUED

4. DASH NUMBER PARTS BELOW HEAVY LINE HAVE LENGTH OF SHANK D EQUAL TO $\frac{D(MAX)}{2}$

DASH NUMBER PARTS ABOVE HEAVY LINE HAVE LENGTH OF SHANK D SHORTER THAN $\frac{D(MAX)}{2}$

APPROVED 11 MAR 85 REVISED

P.A.	AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust	AS		STUD, LOCKED IN - RING LOCKED, SERRATED, HIGH STRENGTH OVERSIZE REPLACER	MS51497
	99			
PROCUREMENT SPECIFICATION: MIL-S-45909		SUPERSEDES: –		SHEET 3 OF 3

Tooling For MS51497 Studs

STUD DASH NUMBER MS51397	STEP DRILL [1]	WRENCH	LOCKRING DRIVE TOOL	REMOVAL TOOL [2]
-502	SDC390JF	R1105W	SFR5902-3D	SM94-16
-642				
-802				
-503	SDC453JF	R1106W	SFR5902-4D	SM104-18
-643				
-803				
-504	SDC515JF	R1107XW	SFR5902-5D	BT1436
-644				
-804				
-505	SDC625JF	R1108W	SFR5902-6D	SM124-22
-645				
-805				
-506	SDC750JF	R1110W	SFR5902-7D	SM134-24
-646				
-806				
-507	SDC875JF	R1111W	SFR5902-8D	SM144-25
-647				
-807				
-508	SDC1000JF	R1112W	SFR5902-9D	SM161-30
-648				
-808				

NOTES: UNLESS OTHERWISE SPECIIFIED
[1] Step drills are designed for thru hole drilling. When used to drill a blind hole, it may be necessary to grind the drill to suit the depth required.
[2] See page 27 for removal instructions.

INTERCHANGEABILITY TABLES MS VERSUS ROSÁN

STUDS

MS PART NUMBER	ROSÁN PART NUMBER
MS51497A642-8	SFR5902A642-8
MS51497A642-(9 thru 64)	SFR5902A642-(9 thru 64)
MS51497A643-9	SFR5902A643-9
MS51497A643-10	SFR5902A643-10
MS51497A643-11	SFR5902A643-11
MS51497A643-(12 thru 64)	SFR5902A643-(12 thru 64)
MS51497A644-11	SFR5902A644-11
MS51497A644-12	SFR5902A644-12
MS51497A644-(13 thru 64)	SFR5902A644-(13 thru 64)
MS51497A645-12	SFR5902A645-12
MS51497A645-13	SFR5902A645-13
MS51497A645-(14 thru 64)	SFR5902A645-(14 thru 64)
MS51497A646-15	SFR5902A646-15
MS51497A646-(16 thru 64)	SFR5902A646-(16 thru 64)
MS51497A647-16	SFR5902A647-16
MS51497A647-(17 thru 64)	SFR5902A647-(17 thru 64)
MS51497A648-18	SFR5902A648-18
MS51497A648-(19 thru 64)	SFR5902A648-(19 thru 64)
MS51497A802-8	SFR5902A802-8
MS51497A802-(9 thru 64)	SFR5902A802-(9 thru 64)
MS51497A803-9	SFR5902A803-9
MS51497A803-10	SFR5902A803-10
MS51497A803-11	SFR5902A803-11
MS51497A803-(12 thru 64)	SFR5902A803-(12 thru 64)
MS51497A804-11	SFR5902A804-11
MS51497A804-12	SFR5902A804-12
MS51497A804-(13 thru 64)	SFR5902A804-(13 thru 64)
MS51497A805-12	SFR5902A805-12
MS51497A805-13	SFR5902A805-13
MS51497A805-(14 thru 64)	SFR5902A805-(14 thru 64)
MS51497A806-15	SFR5902A806-15
MS51497A806-(16 thru 64)	SFR5902A806-(16 thru 64)
MS51497A807-16	SFR5902A807-16
MS51497A807-(17 thru 64)	SFR5902A807-(17 thru 64)
MS51497A808-18	SFR5902A808-18
MS51497A808-(19 thru 64)	SFR5902A808-(19 thru 64)
MS51497B502-8	SFR5902B502-8
MS51497B502-(9 thru 64)	SFR5902B502-(9 thru 64)
MS51497B503-9	SFR5902B503-9
MS51497B503-10	SFR5902B503-10
MS51497B503-11	SFR5902B503-11
MS51497B503-(12 thru 64)	SFR5902B503-(12 thru 64)
MS51497B504-11	SFR5902B504-11
MS51497B504-12	SFR5902B504-12
MS51497B504-(13 thru 64)	SFR5902B504-(13 thru 64)
MS51497B505-12	SFR5902B505-12
MS51497B505-13	SFR5902B505-13
MS51497B505-(14 thru 64)	SFR5902B505-(14 thru 64)
MS51497B506-15	SFR5902B506-15
MS51497B506-(16 thru 64)	SFR5902B506-(16 thru 64)
MS51497B507-16	SFR5902B507-16
MS51497B507-(17 thru 64)	SFR5902B507-17 thru 64)
MS51497B508-18	SFR5902B508-18
MS51497B508-(19 thru 64)	SFR5902B508-(19 thru 64)

MS PART NUMBER	ROSÁN PART NUMBER
MS51497C502-8	SFR5902C502-8
MS51497C502-(9 thru 64)	SFR5902C502-(9 thru 64)
MS51497C503-9	SFR5902C503-9
MS51497C503-10	SFR5902C503-10
MS51497C503-11	SFR5902C503-11
MS51497C503-(12 thru 64)	SFR5902C503-(12 thru 64)
MS51497C504-11	SFR5902C504-11
MS51497C504-12	SFR5902C504-12
MS51497C504-(13 thru 64)	SFR5902C504-(13 thru 64)
MS51497C505-12	SFR5902C505-12
MS51497C505-13	SFR5902C505-13
MS51497C505-(14 thru 64)	SFR5902C505-(14 thru 64)
MS51497C506-15	SFR5902C506-15
MS51497C506-(16 thru 64)	SFR5902C506-(16 thru 64)
MS51497C507-16	SFR5902C507-16
MS51497C507-(17 thru 64)	SFR5902C507-(17 thru 64)
MS51497C508-18	SFR5902C508-18
MS51497C508-(19 thru 64)	SFR5902C508-(19 thru 64)
MS51497C642-8	SFR5902C642-8
MS51497C642-(9 thru 64)	SFR5902C642-(9 thru 64)
MS51497C643-9	SFR5902C643-9
MS51497C643-10	SFR5902C643-10
MS51497C643-11	SFR5902C643-11
MS51497C643-(12 thru 64)	SFR5902C643-(12 thru 64)
MS51497C644-11	SFR5902C644-11
MS51497C644-12	SFR5902C644-12
MS51497C644-(13 thru 64)	SFR5902C644-(13 thru 64)
MS51497C645-12	SFR5902C645-12
MS51497C645-13	SFR5902C645-13
MS51497C645-(14 thru 64)	SFR5902C645-(14 thru 64)
MS51497C646-15	SFR5902C646-15
MS51497C646-(16 thru 64)	SFR5902C646-(16 thru 64)
MS51497C647-16	SFR5902C647-16
MS51497C647-(17 thru 64)	SFR5902C647-(17 thru 64)
MS51497C648-18	SFR5902C648-18
MS51497C648-(19 thru 64)	SFR5902C648-(19 thru 64)
MS51497C802-8	SFR5902C802-2
MS51497C802-(9 thru 64)	SFR5902C802-(9 thru 64)
MS51497C803-9	SFR5902C803-9
MS51497C803-10	SFR5902C803-10
MS51497C803-11	SFR5902C803-11
MS51497C803-(12 thru 64)	SFR5902C803-(12 thru 64)
MS51497C804-11	SFR5902C804-11
MS51497C804-12	SFR5902C804-12
MS51497C804-(13 thru 64)	SFR5902C804-(13 thru 64)
MS51497C805-12	SFR5902C805-12
MS51497C805-13	SFR5902C805-13
MS51497C805-(14 thru 64)	SFR5902C805-(14 thru 64)
MS51497C806-15	SFR5902C806-15
MS51497C806-(16 thru 64)	SFR5902C806-(16 thru 64)
MS51497C807-16	SFR5902C807-16
MS51497C807-(17 thru 64)	SFR5902C807-(17 thru 64)
MS51497C808-18	SFR5902C808-18
MS51497C808-(19 thru 64)	SFR5902C808-(19 thru 64)

INTERCHANGEABILITY TABLES MS VERSUS ROSÁN

STUDS

MS PART NUMBER	ROSÁN PART NUMBER
MS51497D502-8	SFR5902D502-8
MS51497D502-(9 thru 64)	SFR5902D502-(9 thru 64)
MS51497D503-9	SFR5902D503-9
MS51497D503-10	SFR5902D503-10
MS51497D503-11	SFR5902D503-11
MS51497D503-(12 thru 64)	SFR5902D503-(12 thru 64)
MS51497D504-11	SFR5902D504-11
MS51497D504-12	SFR5902D504-12
MS51497D504-(13 thru 64)	SFR5902D504-(13 thru 64)
MS51497D505-12	SFR5902D505-12
MS51497D505-13	SFR5902D505-13
MS51497D505-(14 thru 64)	SFR5902D505-(14 thru 64)
MS51497D506-15	SFR5902D506-15
MS51497D506-(16 thru 64)	SFR5902D506-(16 thru 64)
MS51497D507-16	SFR5902D507-16
MS51497D507-(17 thru 64)	SFR5902D507-(17 thru 64)
MS51497D508-18	SFR5902D508-18
MS51497D508-(19 thru 64)	SFR5902D508-(19 thru 64)
MS51497E502-8	SFR5902E502-8
MS51497E502-(9 thru 64)	SFR5902E502-(9 thru 64)
MS51497E503-9	SFR5902E503-9
MS51497E503-10	SFR5902E503-10
MS51497E503-11	SFR5902E503-11
MS51497E503-(12 THRU 64)	SFR5902E503-(12 THRU 64)
MS51497E504-11	SFR5902E504-11
MS51497E504-12	SFR5902E504-12
MS51497E504-(13 thru 64)	SFR5902E504-(13 thru 64)
MS51497E505-12	SFR5902E505-12
MS51497E505-13	SFR5902E505-13
MS51497E505-(14 thru 64)	SFR5902E505-(14 thru 64)
MS51497E506-15	SFR5902E506-15
MS51497E506-(16 thru 64)	SFR5902E506-(16 thru 64)
MS51497E507-16	SFR5902E507-16
MS51497E507-(17 thru 64)	SFR5902E507-(17 thru 64)
MS51497E508-18	SFR5902E508-18
MS51497E508-(19 thru 64)	SFR5902E508-(19 thru 64)
MS51497E642-8	SFR5902E642-8
MS51497E642-(9 thru 64)	SFR5902E642-(9 thru 64)
MS51497E643-9	SFR5902E643-9
MS51497E643-10	SFR5902E643-10
MS51497E643-11	SFR5902E643-11
MS51497E643-(12 thru 64)	SFR5902E643-(12 thru 64)
MS51497E644-11	SFR5902E644-11
MS51497E644-12	SFR5902E644-12
MS51497E644-(13 thru 64)	SFR5902E644-(13 thru 64)
MS51497E645-12	SFR5902E645-12
MS51497E645-13	SFR5902E645-13
MS51497E645-(14 thru 64)	SFR5902E645-(14 thru 64)
MS51497E646-15	SFR5902E646-15
MS51497E646-(16 thru 64)	SFR5902E646-(16 thru 64)
MS51497E647-16	SFR5902E647-16
MS51497E647-(17 thru 64)	SFR5902E647-(17 thru 64)
MS51497E648-18	SFR5902E648-18
MS51497E648-(19 thru 64)	SFR5902E648-(19 thru 64)

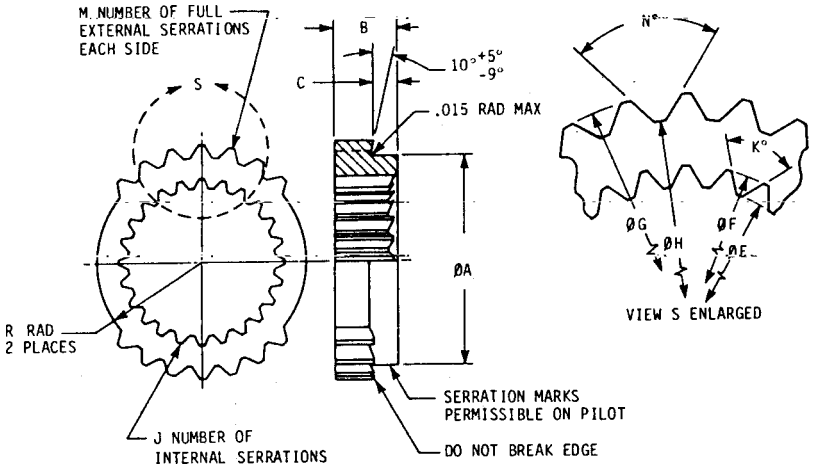
MS PART NUMBER	ROSÁN PART NUMBER
MS51497E802-8	SFR5902E802-8
MS51497E802-(9 thru 64)	SFR5902E802-(9 thru 64)
MS51497E803-9	SFR5902E803-9
MS51497E803-10	SFR5902E803-10
MS51497E803-11	SFR5902E803-11
MS51497E803-(12 thru 64)	SFR5902E803-(12 thru 64)
MS51497E804-11	SFR5902E804-11
MS51497E804-12	SFR5902E804-12
MS51497E804-(13 thru 64)	SFR5902E804-(13 thru 64)
MS51497E805-12	SFR5902E805-12
MS51497E805-13	SFR5902E805-13
MS51497E805-(14 thru 64)	SFR5902E805-(14 thru 64)
MS51497E806-15	SFR5902E806-15
MS51497E806-(16 thru 64)	SFR5902E806-(16 thru 64)
MS51497E807-16	SFR5902E807-16
MS51497E807-(17 thru 64)	SFR5902E807-(17 thru 64)
MS51497E808-18	SFR5902E808-18
MS51497E808-(19 thru 64)	SFR5902E808-(19 thru 64)

LOCKRINGS

MS PART NUMBER	ROSÁN PART NUMBER
MS51997-102P	RLRR1997-102
MS51997-103P	RLRR1997-103
MS51997-104P	RLRR1997-104
MS51997-105P	RLRR1997-105
MS51997-106P	RLRR1997-106
MS51997-107P	RLRR1997-107
MS51997-108P	RLRR1997-108
MS51997-109P	RLRR1997-109
MS51997E102P	RLRR1997E102
MS51997E103P	RLRR1997E103
MS51997E104P	RLRR1997E104
MS51997E105P	RLRR1997E105
MS51997E106P	RLRR1997E106
MS51997E107P	RLRR1997E107
MS51997E108P	RLRR1997E108
MS51997E109P	RLRR1997E109

NOTES: UNLESS OTHERWISE SPECIFIED
1. For nut end length, see table IV, page 20.

FED. SUP CLASS
5340



NO SPECIFIC ANGULARITY EXISTS BETWEEN INTERNAL AND EXTERNAL SERRATIONS. THE SERRATED SECTORS WILL BE LOCATED DIAMETRICALLY OPPOSITE.

TABLE I. DIMENSIONS

0A DASH NUMBERS	B +.008 -.007	C +.010 -.005	0E	0F +.004 -.003	0G	0H +.005 -.004	J +.003 -.006	K°	M +1° -2°	N°	R	RAD REF
-102P	.305	.100	.044	.213	.252	.353	.310	13	102°	4	100°	.154
-103P	.368	.110	.044	.266	.315	.416	.373	17	86°	5	98°	.186
-104P	.430	.138	.044	.323	.364	.478	.435	20	102°	6	97°	.217
-105P	.493	.157	.040	.390	.425	.541	.498	24	102°	7	96°	.248
-106P	.606	.157	.040	.468	.505	.657	.611	26	102°	7	96°	.304
-107P	.731	.161	.040	.574	.613	.782	.736	26	111°	8	95°	.366
-108P	.856	.213	.040	.695	.740	.907	.861	30	111°	9	94°	.429
-109P	.981	.213	.040	.794	.845	1.034	.986	30	111°	10	96°	.492

TABLE II.
INTERCHANGEABILITY
SEE NOTE 2

PART NUMBERS	
CANCELLED	NEW
MS51997 -102 -103	MS51997 -102P -103P
-104 -105 -106 -107 -108	-104P -105P -106P -107P -108P
N/A	-109P
C102	E102P
C103	E103P
C104	E104P
C105	E105P
C106	E106P
C107	E107P
C108	E108P
N/A	E109P

REQUIREMENTS:

1. MATERIAL: Steel, carbon, Grade 1117 (UNS G11170) in accordance with ASTM A108. Steel, corrosion-resistant, Type A286 (UNS S66286) in accordance with AMS 5731 or AMS5734, heat treated and aged.
2. PROTECTIVE COATING: Steel, carbon, shall be cadmium plated in accordance with QQ-P-416, Type II,Class 3. Steel, corrosion-resistant, shall be cleaned, descaled and passivated in accordance with ASTM A380.
3. SURFACE ROUGHNESS: Machined surfaces to be 125 microinches in accordance with ANSI B46.1, except serrations.
4. HARDNESS: Rings of carbon steel shall be case hardened to 36-45 HRC in accordance with procurement specification. Rings of corrosion-resistant steel shall be hardened to 269 HB minimum in accordance with procurement specification.
5. FILLETS: Fillets shall be .015 RAD maximum.
6. EDGES: Edges broken .003-.015 unless otherwise specified.
7. TOLERANCES: Linear dimensions ±.005, angular dimensions ±2°.
8. PART NUMBERS: The MS part number consists of the MS number, plus the dash number. Add “E” in lieu of “dash” for corrosion-resistant steel. EXAMPLE:
   MS51997-104P Lockring, Carbon Steel, Partial Serrations
   MS51997E104P Lockring, Cres, Partial Serrations

NOTES:

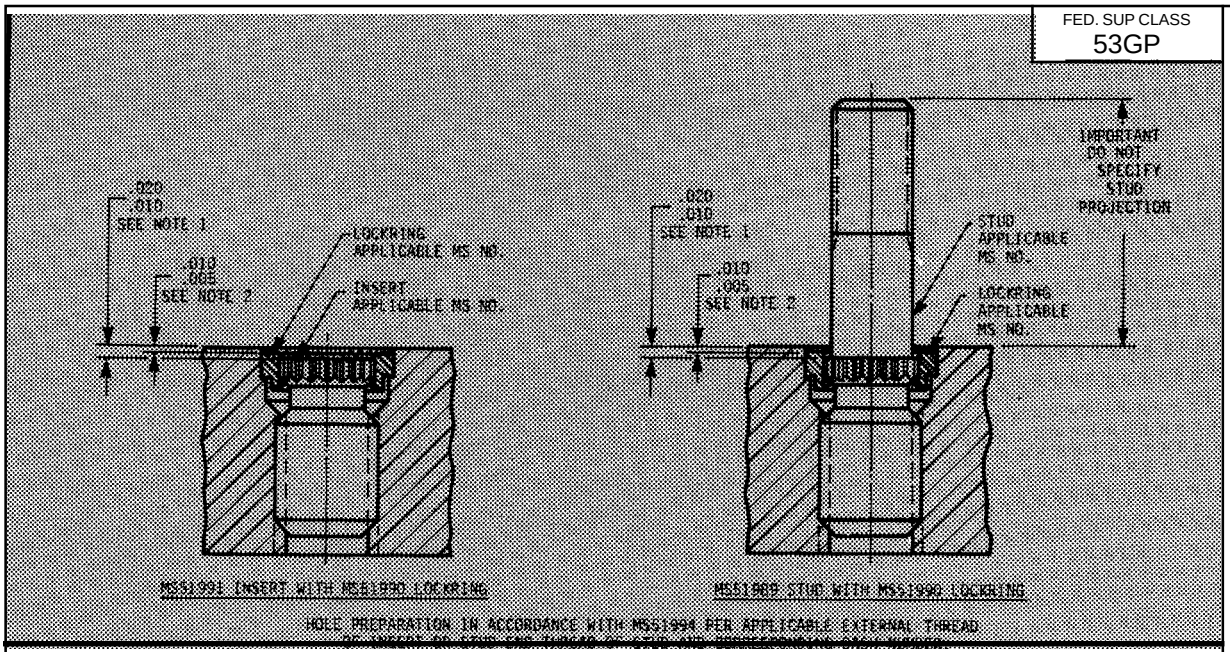
1. Dimensions are in inches.
2. The dash numbers “-100” and “C100” series lockrings in the original issue of this standard are cancelled/inactivated after revision “A”. The cancelled lockrings should be used on existing callouts until stock is depleted. Use the new “-100P” and “E100P” series lockrings for replacement of “-100” and “C100” series cres lockrings in accordance with Table II. Use “-100P” and “E100P” lockrings for all new design.
3. In the event of a conflict between the text of this standard and the reference cited herein, the text of this standard shall take precedence.
4. Reference Government (or non-government) documents of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

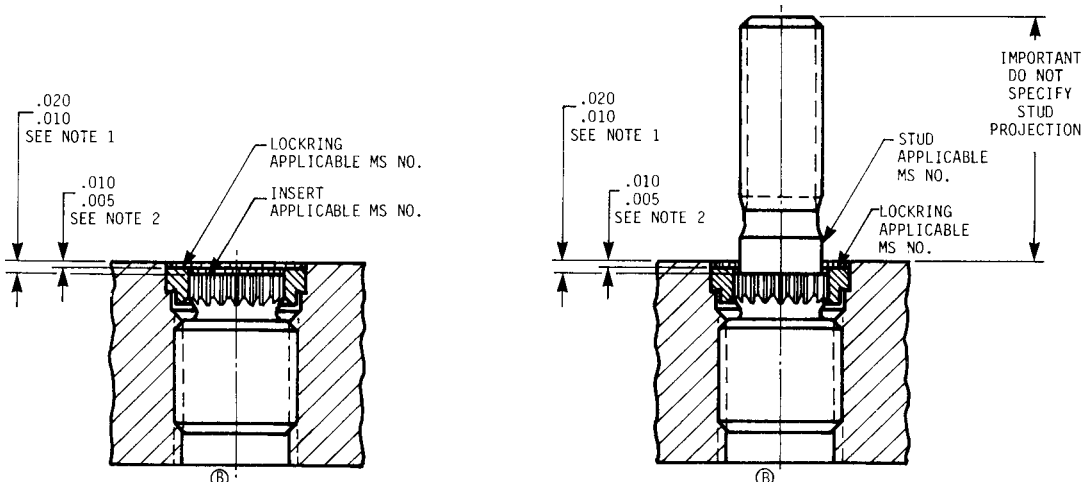
APPROVED 12 DEC 67 REVISED A 10 FEB 69 B 11 MAR 85

P.A. AR	INTERNATIONAL INTEREST	TITLE	MILITARY STANDARD
Other Cust 99		RING, LOCKED, SERRATED- HIGH STRENGTH	MS51997
PROCUREMENT SPECIFICATION MIL-S-45910	SUPERSEDES: –		SHEET 1 OF 1

DD FORM 1 MAY 73 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE 5340-1587

FED. SUP CLASS
53GP





HOLE PREPARATION IN ACCORDANCE WITH MS51996 PER APPLICABLE EXTERNAL THREAD
OF INSERT OR STUD END THREAD OF STUD AND CORRESPONDING DASH NUMBER

NOTES:

1. INSTALL INSERT OR STUD TO DEPTH SHOWN.
2. DRIVE LOCKRING TO DEPTH SHOWN.
3. TYPICAL DRAWING CALLOUT TO BE LOCATED IN VICINITY OF PART IDENTIFICATION:

FOR INSERT

INSTALL INSERT IN ACCORDANCE
WITH MS51995

INSERT VIEW

FOR STUD

INSTALL STUD IN ACCRODANCE
WITH MS51995

STUD VIEW

4. REPLACEMENT OF INSERTS, STUDS AND LOCKRINGS IS MADE WITH SAME SIZE PARTS AS THOSE REMOVED, USE ABOVE INSTALLATION PROCEDURE EXCEPT BEFORE DRIVING NEW LOCKRING, ROTATE THE LOCKRING EXTERNAL SERRATIONS TO A POSTITION ALIGNED WITH THOSE IN PARENT MATERIAL. iF MATERIAL IS DAMAGED. uSE OVERSIZE STUDS SPECIFIED ABOVE.
5. DIMENSIONS ARE IN INCHES.
6. IN THE EVENT OF A CONFLICT BETWEEN THE TEXT OF THIS STANDARD AND THE REFERENCES, CITED HEREIN. THE TEXT OF THIS STANDARD SHALL TAKE PRECEDENCE.

B DENOTES CHANGES

P.A. AR Other Cust AS 99	TITLE **FASTENERS, RING LOCKED INSERTS AND STUDS INSTALLATION AND REPLACEMENT OF**		MILITARY STANDARD **MS51995**
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –		SHEET 1 OF 1

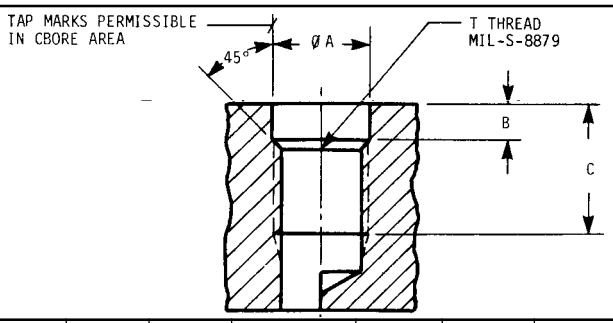
DD FORM 1 SEP 67 672-1 *(COORDINATED)* PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

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

APPROVED 17 AUG 66 REVISED A 12 DEC 67 B 11 MAR 85

This military standard is mandatory for use by all Department 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.

FED. SUP CLASS
53GP



NOMINAL EXTERNAL THREAD SIZE OF INSERT AND STUD END THREAD SIZE OF STUD	INSERT DASH NUMBER MS51993 REF	INSERT DASH NUMBER MS51498 REF	STUD DASH NUMBER MS51992 REF	STUD DASH NUMBER MS51497 REF	T THREAD CLASS 3B INSERT AND STUD	0A INSERT AND STUD +.005 -.000	B INSERT AND STUD +.015 -.000	C MIN FULL THREAD DEPTH INSERT MS51993	C MIN FULL THREAD DEPTH INSERT MS51498	C MIN FULL THREAD DEPTH STUD MS51992	C MIN FULL THREAD DEPTH STUD MS51497
.3125-18	——	——	-802	——	.3125-18UNJC	.328	.112	——	——	.561	——
.3125-24	——	——	-502 -642	——	.3125-24UNJF	.328	.112	——	——	.436 .483	——
.3750-16	-803	——	-803	——	.3750-16UNJC	.390	.122	.588	——	.723	——
.3750-24	-503 -643	——	-503 -643	-502 -642	.3750-24UNJF	.390	.122	.450 .498	——	.536 .608	.436 .483 .561
.4375-14	-804	——	-804	——	4375-14UNJC	.453	.151	.781	——	.918	——
.4375-20	-504 -644	-503 -643 -803	-504 -644	-503 -643 -803	.4375-20UNJF	.453	.151	.592 .666	.450 .498 .588	.677 .775	.536 .608 .723
.5000-13	-805	——	-805	——	.5000-13UNJC	.515	.174	.982	——	1.126	——
.5000-20	-505 -645	-504 -644 -804	-505 -645	-504 -644 -804	.5000-20UNJF	.515	.174	.728 .826	.592 .666 .781	.812 .943	.677 .775 .918
.6250-11	-806	——	-806	——	.6250-11UNJC	.625	.174	1.111	——	1.206	——
.6250-18	-506 -646	-505 -645 -805	-506 -646	-505 -645 -805	.6250-18UNJF	.625	.174	.800 .922	.728 .826 .982	.858 .998	.812 .943 1.126
.7500-10	-807	——	-807	——	.7500-10UNJC	.750	.178	1.205	——	1.317	——
.7500-16	-507 -647	-506 -646 -806	-507 -647	-506 -646 -806	.7500-16UNJF	.750	.178	.863 .998	.800 .922 1.111	.933 1.088	.858 .998 1.206
.8750-9	-808	——	-808	——	.8750-9UNJC	.875	.230	1.383	——	1.706	——
.8750-14	-508 -648	-507 -647 -807	-508 -648	-507 -647 -807	.8750-14UNJF	.875	.230	.998 1.151	.863 .998 1.205	1.203 1.414	.933 1.088 1.317
1.0000-12	——	-508 -648 -808	——	-508 -648 -808	1.0000-12UNJF	1.000	.230	——	.998 1.151 1.383	——	1.203 1.414 1.706

REQUIREMENTS:
1. Diameter "A" and minor diameter of thread to be concentric within .003 FIM.
2. Axis of hole to be normal to entry surface or provide spotface when required.
3. Unless otherwise specified machined surfaces to be 125 microinches in accordance with ANSI B46.1.
4. Remove all burrs and sharp edges.
5. Tolerances for linear dimension ±.005, angular dimensions ±5°.

NOTES:
1. Dimensions are in inches.
2. Procedure and installation of ring locked inserts, studs, and lockrings, see MS51995.
3. Nominal use: For installation of ring locked inserts and studs, high strength.
4. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.
5. Referenced Government (or non-government) documents of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

THIS IS A DESIGN STANDARD. NOT TO BE USED AS A PART NUMBER.
A ENTIRE STANDARD REVISED

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

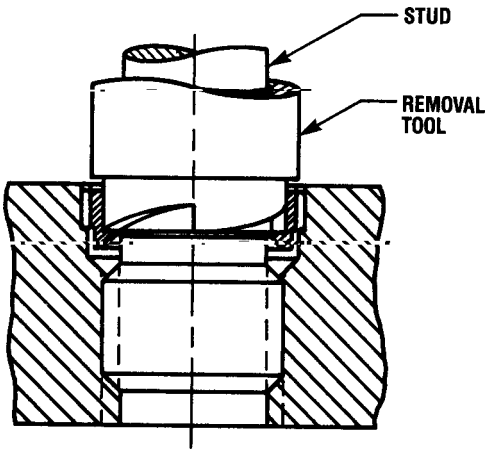
APPROVED 17 AUG 66 REVISED A 12 DEC 67 B 11 MAR 85

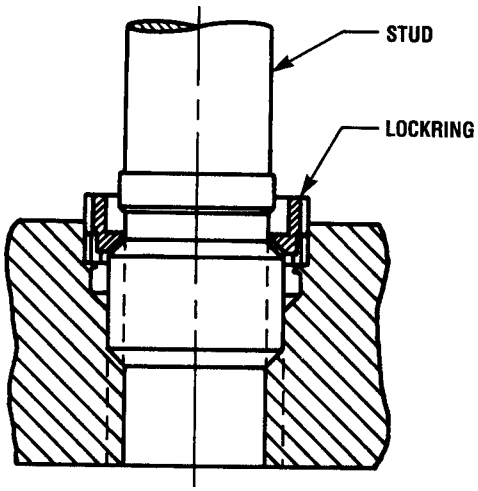
This military standard is mandatory for use by all Department and Agencies of the Department of Defense. Selection for all new engineering and design applications and for repetitive use shall be made from this document.

P.A. AR Other Cust AS 99	TITLE HOLE PREPARATION - RING LOCKED INSERTS AND STUD, HIGH STRENGTH STANDARD DIMENSIONS FOR	MILITARY STANDARD MS51996	
PROCUREMENT SPECIFICATION MIL-S-45909	SUPERSEDES: –	SHEET 1 OF 1	

DD FORM 1 SEP 67 672-1 (COORDINATED) PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

REMOVAL PROCEDURE
RING LOCKED STUDS
MS51989, MS51992,
MS51497 AND DOD-S-63275/1





REMOVAL

1. Securely clamp part from which stud is to be removed to drill press table after carefully aligning axes of stud and drill press spindle. Set spindle speed a 300 to 700 RPM.

2. Secure removal tool in chuck and lower over stud shank before starting motor.

3. Without raising spindle, start motor. Mill lockring, raising tool every 1/2 second to allow chips to clear cutting teeth. Best results will be obtained by not milling completely through lockring.

4. Apply removal torque to stud. When stud thread flanks bear against lower surface of lockring, continued removal torque will cause the lockring to be jacked out. Stud removal may thus be completed.

5. If lockring has been milled completely through and fails to lift out with stud, the portion remaining may be collapsed with a punch and removed.

NOTE:
Replacement of Rosán studs and lockrings is made with same size parts as those removed and in same manner as originally installed. Rotate new lockring if necessary, before driving, to a position in which the external serrations are aligned with those in the parent material.

STUD SHEAR ENGAGEMENT AREAS

MS51989

MS51989 DASH NUMBER	SHEAR ENGAGEMENT AREA[1]
-102 -302	.0206
-103 -303	.0667
-104 -304	.1131
-105 -305	.2088
-106 -306	.3489
-107 -307	.4089
-108 -308	.5249
-109 -309	.6489
-110 -310	.8526
-111 -311	1.1772
-112 -312	1.7034

MS51989

MS51989 DASH NUMBER	SHEAR ENGAGEMENT AREA[1]
-202 -402	.0216
-203 -403	.0701
-204 -404	.1290
-205 -405	.2335
-206 -406	.3768
-207 -407	.4744
-208 -408	.6140
-209 -409	.6908
-210 -410	.9989
-211 -411	1.3612
-212 -412	1.9309

MS51992

MS51992 DASH NUMBER	SHEAR ENGAGEMENT AREA[1]
-502	.1255
-503	.2264
-504	.3684
-505	.5524
-506	.7472
-507	1.0204
-508	1.6251
-642	.1594
-643	.2890
-644	.4694
-645	.7070
-646	.9530
-647	1.2955
-648	2.0649
-802	.2050
-803	.3708
-804	.5905
-805	.8881
-806	1.2105
-807	1.6410
-808	2.5955

MS51497

MS51497 DASH NUMBER	SHEAR ENGAGEMENT AREA[1]
-502	.1396
-503	.2450
-504	.3931
-505	.6796
-506	.8873
-507	1.0625
-508	1.8267
-642	.1804
-643	.3192
-644	.5088
-645	.8722
-646	1.1358
-647	1.3855
-648	2.3311
-802	.2486
-803	.4377
-804	.6775
-805	1.1412
-806	1.5032
-807	1.8627
-808	3.0291

NOTES: UNLESS OTHERWISE SPECIFIED

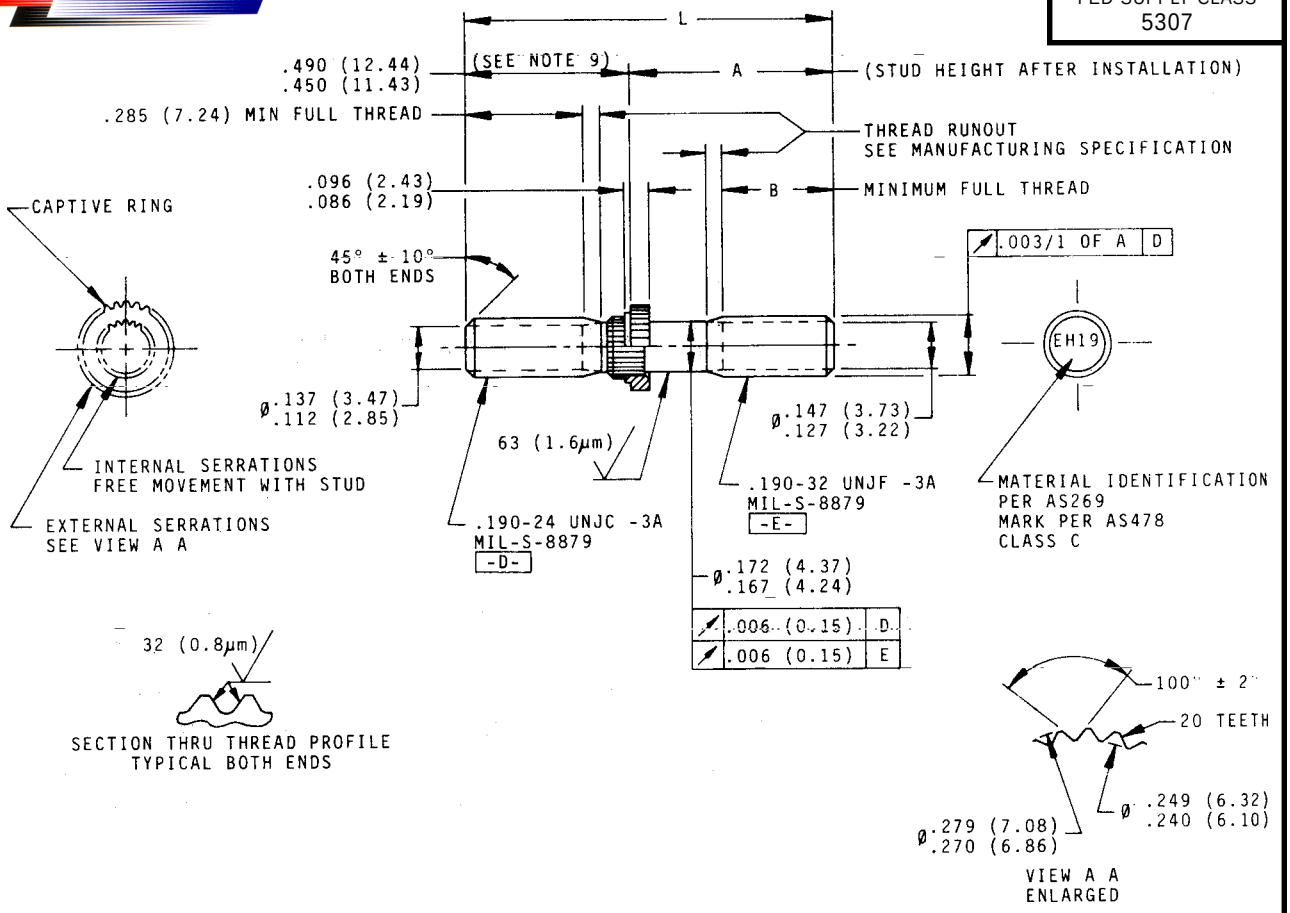
[1] The thread minimum shear engagement area is the axial thread shear area of the stud assembly (stud end thd to boss thd) that must resist thread stripping due to tensile loads being applied. It does not represent a dimension of either of the members in an unassembled condition.

AEROSPACE STANDARDS

INDEX

Fairchild Fasteners

FED SUPPLY CLASS
5307



1. MATERIAL: STUD - CORROSION AND HEAT RESISTANT STEEL, AMS5731.
   RING - CORROSION RESISTANT STEEL, AMS5640.
2. FINISH: STUD - NONE.
   RING - NONE.
3. MANUFACTURING SPECIFICATION: AMS7482, EXCEPT STRESS RUPTURE TEST IS WAIVED, AND STUD END THREAD REQUIREMENTS OF AS3062, INCOMPLETE LEAD AND RUNOUT THREADS, IS NOT APPLICABLE.
4. FLUORESCENT PENETRANT INSPECTION PER AMS2645. EXCEPT RING.
5. SURFACE TEXTURE: SYMBOLS PER ANSI Y14.36-1978, REQUIREMENTS PER ANSI B46.1-1978. UNLESS OTHERWISE SPECIFIED, SURFACES TO BE 125 MICROINCHES (3.2 MICROMETERS).
6. DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.
7. BREAK SHARP EDGES .003-.015 (0.08-0.38) UNLESS OTHERWISE SPECIFIED.
8. DIMENSIONS IN INCHES, (MILLIMETERS), METRIC CONVERSIONS IN PARENTHESIS ARE IN INTERNATIONAL SYSTEMS UNITS (SI).
9. DIMENSIONS APPLY WHEN LOCKRING IS AGAINST STOP TOWARD .190-32 THREAD.
10. MARK AEROSPACE STANDARD IDENTIFICATION NUMBER AND MANUFACTURER'S IDENTIFICATION ON CONTAINER.
11. DO NOT USE UNASSIGNED AEROSPACE STANDARD IDENTIFICATION NUMBERS.
12. INSTALLATION SHALL BE IN ACCORDANCE WITH AS1561.

SOURCE OF SUPPLY
ROSAN, INC.
NEWPORT BEACH, CALIFORNIA 92663
MANUFACTURER'S CODE IDENTIFICATION NUMBER 83324
DRAWING NUMBER SFC-SUM SERIES

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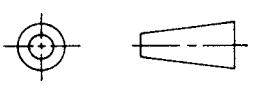
THIRD ANGLE PROJECTION



Prepared by SAE COMMITTEE E-25, Engine & Propeller Standard Utility Parts

SOURCE CONTROL DRAWING

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD IDENTIFICATION

STUD-STRAIGHT, RING LOCKED, CRES AMS5731
.190-24 UNJC X .190-32 UNJF

AS3319

SHEET 1 OF 2

Fairchild Fasteners

AS IDENTIFICATION NUMBER	L REF		A (SEE NOTE 9)		B		APPROX MASS		VENDOR NUMBER
	IN.	(mm)	IN.	(mm)	IN.	(mm)	LB/100	kg/100	
AS3319-01	.970	24.64	.485- .515	12.32-13.08	.344	8.73	.68	0.30	SFC190SUM-8
AS3319-02	1.032	26.21	.547- .577	13.90-14.65	.406	10.31	.73	0.33	SFC190SUM-9
AS3319-03	1.095	27.81	.610- .640	15.50-16.25	.468	11.88	.77	0.35	SFC190SUM-10
AS3319-04	1.158	29.41	.673- .703	17.10-17.85	.531	13.48	.82	0.37	SFC190SUM-11
AS3319-05	1.220	30.99	.735- .765	18.67-19.43	.562	14.27	.86	0.39	SFC190SUM-12
AS3319-06	1.282	32.56	.797- .827	20.25-21.00	.562	14.27	.91	0.41	SFC190SUM-13
AS3319-07	1.345	34.16	.860- .890	21.85-22.60	.562	14.27	.95	0.43	SFC190SUM-14
AS3319-08	1.408	35.76	.923- .953	23.45-24.20	.562	14.27	1.00	0.45	SFC190SUM-15
AS3319-09	1.470	37.34	.985-1.015	25.02-25.78	.562	14.27	1.04	0.47	SFC190SUM-16
AS3319-10	1.532	38.91	1.047-1.077	26.60-27.35	.562	14.27	1.09	0.49	SFC190SUM-17
AS3319-11	1.595	40.51	1.110-1.140	28.20-28.95	.562	14.27	1.13	0.51	SFC190SUM-18

THIRD ANGLE PROJECTION

Prepared by SAE COMMITTEE E-25, Engine & Propeller Standard Utility Parts

SOURCE CONTROL DRAWING

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD IDENTIFICATION

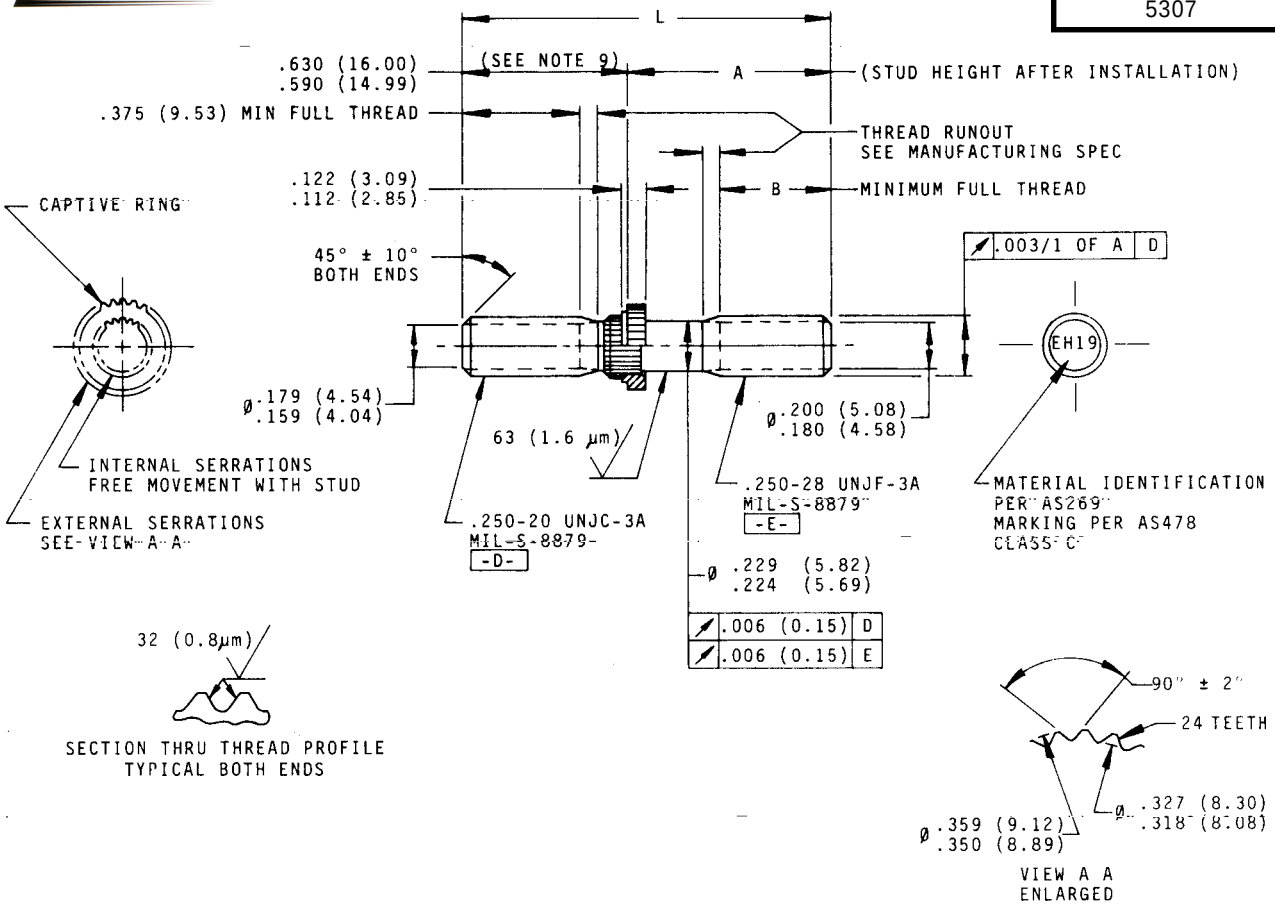
STUD-STRAIGHT, RING LOCKED, CRES AMS5731
.190-24 UNJC X .190-32 UNJF

AS3319

SHEET 2 OF 2

Fairchild Fasteners

FED SUPPLY CLASS
5307



1. MATERIAL: STUD - CORROSION AND HEAT RESISTANT STEEL, AMS5731.
   RING - CORROSION RESISTANT STEEL, AMS5640.
2. FINISH: STUD - NONE.
   RING - NONE.
3. MANUFACTURING SPECIFICATION: AMS7482, EXCEPT STRESS RUPTURE TEST IS WAIVED, AND STUD END THREAD REQUIREMENTS OF AS3062, INCOMPLETE LEAD AND RUNOUT THREADS, IS NOT APPLICABLE.
4. FLUORESCENT PENETRANT INSPECTION PER AMS2645. EXCEPT RING.
5. SURFACE TEXTURE: SYMBOLS PER ANSI Y14.36-1978, REQUIREMENTS PER ANSI B46.1-1978. UNLESS OTHERWISE SPECIFIED, SURFACES TO BE 125 MICROINCHES (3.2 MICROMETERS).
6. DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.
7. BREAK SHARP EDGES .003-.015 (0.08-0.38) UNLESS OTHERWISE SPECIFIED.
8. DIMENSIONS IN INCHES, (MILLIMETERS), METRIC CONVERSIONS IN PARENTHESIS ARE IN INTERNATIONAL SYSTEMS UNITS (SI).
9. DIMENSIONS APPLY WHEN LOCKRING IS AGAINST STOP TOWARD .250-28 THREAD.
10. MARK AEROSPACE STANDARD IDENTIFICATION NUMBER AND MANUFACTURER'S IDENTIFICATION ON CONTAINER.
11. DO NOT USE UNASSIGNED AEROSPACE STANDARD IDENTIFICATION NUMBERS.
12. INSTALLATION SHALL BE IN ACCORDANCE WITH AS1561.

SOURCE OF SUPPLY
ROSAN, INC.
NEWPORT BEACH, CALIFORNIA 92663
MANUFACTURER'S CODE IDENTIFICATION NUMBER 83324
DRAWING NUMBER SFC-SUM SERIES

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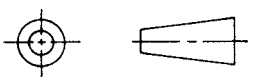
THIRD ANGLE PROJECTION



Prepared by SAE COMMITTEE E-25, Engine & Propeller Standard Utility Parts

SOURCE CONTROL DRAWING

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD IDENTIFICATION
STUD-STRAIGHT, RING LOCKED, CRES AMS5731
.250-20 UNJC X .250-28 UNJF

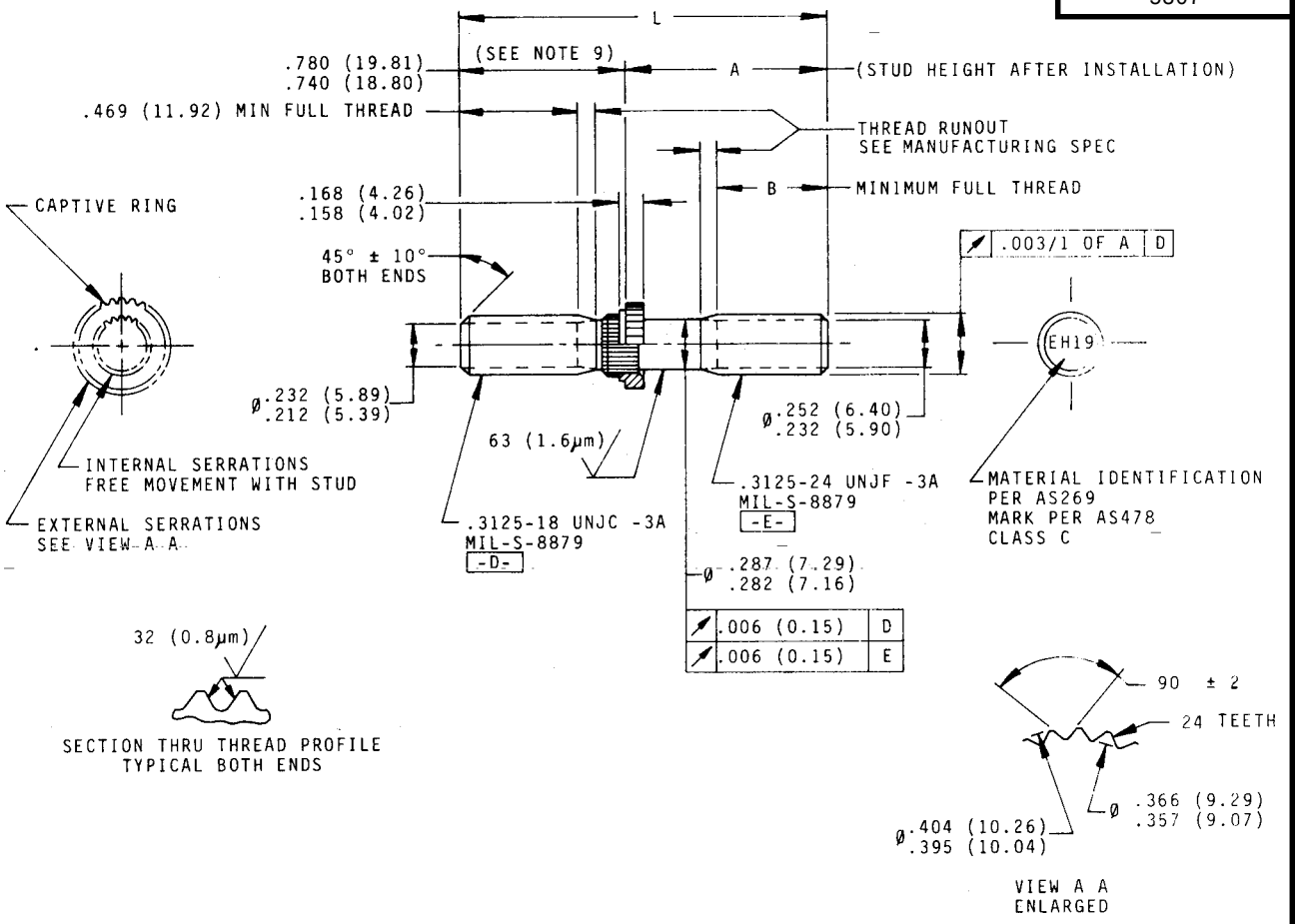
AS3320

SHEET 1 OF 2

AS IDENTIFICATION NUMBER	L REF		A (SEE NOTE 9)		B		APPROX MASS		VENDOR NUMBER
	IN.	(mm)	IN.	(mm)	IN.	(mm)	LB/100	kg/100	
AS3320-01	1.172	29.77	.547-.577	13.90-14.65	.368	9.34	1.44	0.65	SFC250SUM-9
AS3320-02	1.235	31.37	.610-.640	15.50-16.25	.430	10.92	1.51	0.69	SFC250SUM-10
AS3320-03	1.298	32.97	.673-.703	17.10-17.85	.493	12.52	1.59	0.72	SFC250SUM-11
AS3320-04	1.360	34.54	.735-.765	18.67-19.43	.556	14.12	1.66	0.75	SFC250SUM-12
AS3320-05	1.422	36.12	.797-.827	20.25-21.00	.618	15.69	1.73	0.79	SFC250SUM-13
AS3320-06	1.485	37.72	.860-.890	21.85-22.60	.680	17.27	1.80	0.82	SFC250SUM-14
AS3320-07	1.548	39.32	.923-.953	23.45-24.20	.688	17.47	1.88	0.85	SFC250SUM-15
AS3320-08	1.610	40.89	.985-1.015	25.02-25.78	.688	17.47	1.96	0.89	SFC250SUM-16
AS3320-09	1.672	42.47	1.047-1.077	26.60-27.35	.688	17.47	2.03	0.92	SFC250SUM-17
AS3320-10	1.735	44.07	1.110-1.140	28.20-28.95	.688	17.47	2.10	0.95	SFC250SUM-18
AS3320-11	1.798	45.67	1.173-1.203	29.80-30.55	.688	17.47	2.18	0.99	SFC250SUM-19
AS3320-12	1.860	47.24	1.235-1.265	31.37-32.13	.688	17.47	2.25	1.02	SFC250SUM-20
AS3320-13	1.922	48.82	1.297-1.327	32.95-33.70	.688	17.47	2.32	1.05	SFC250SUM-21
AS3320-14	1.985	50.42	1.360-1.390	34.55-35.30	.688	17.47	2.40	1.09	SFC250SUM-22
AS3320-15	2.048	52.02	1.423-1.453	36.15-36.90	.688	17.47	2.47	1.12	SFC250SUM-23
AS3320-16	2.110	53.59	1.485-1.515	37.72-38.48	.688	17.47	2.55	1.15	SFC250SUM-24
AS3320-17	2.172	55.17	1.547-1.577	39-30-40.05	.688	17.47	2.62	1.19	SFC250SUM-25
AS3320-18	2.235	56.77	1.610-1.640	40.90-41.65	.688	17.47	2.67	1.22	SFC250SUM-26
AS3320-19	2.298	58.37	1.673-1.703	42.50-43.25	.688	17.47	2.77	1.26	SFC250SUM-27
AS3320-20	2.360	59.94	1.735-1.765	44-07.44.83	.688	17.47	2.84	1.29	SFC250SUM-28
AS3320-21	2.422	61.52	1.797-1.827	45.65-46.40	.688	17.47	2.92	1.32	SFC250SUM-29
AS3320-22	2.485	63.12	1.860-1.890	47.25-48.00	.688	17.47	2.99	1.36	SFC250SUM-30
AS3320-23	2.548	64.72	1.923-1.953	48.85-49.60	.688	17.47	3.06	1.39	SFC250SUM-31
AS3320-24	2.610	66.29	1.985-2.015	50.42-51.18	.688	17.47	3.14	1.42	SFC250SUM-32
AS3320-25	2.735	69.47	2.110-2.140	53.60-54.35	.688	17.47	3.28	1.49	SFC250SUM-34
AS3320-26	2.860	72.64	2.235-2.265	56.77-57.53	.688	17.47	3.43	1.56	SFC250SUM-36
AS3320-27	2.985	75.82	2.360-2.390	59.95-60.70	.688	17.47	3.58	1.62	SFC250SUM-38
AS3320-28	3.110	78.99	2.485-2.515	63.12-63.88	.688	17.47	3.73	1.69	SFC250SUM-40
AS3320-29	3.235	82.17	2.610-2.640	66.30-67.05	.688	17.47	3.87	1.76	SFC250SUM-42
AS3320-30	3.360	85.34	2.735-2.765	69.47-70.23	.688	17.47	4.02	1.82	SFC250SUM-44

Fairchild Fasteners

FED SUPPLY CLASS
5307



1. MATERIAL: STUD - CORROSION AND HEAT RESISTANT STEEL, AMS5731.
   RING - CORROSION RESISTANT STEEL, AMS5640.
2. FINISH: STUD - NONE.
   RING - NONE.
3. MANUFACTURING SPECIFICATION: AMS7482, EXCEPT STRESS RUPTURE TEST IS WAIVED, AND STUD END THREAD REQUIREMENTS OF AS3062, INCOMPLETE LEAD AND RUNOUT THREADS, IS NOT APPLICABLE.
4. FLUORESCENT PENETRANT INSPECTION PER AMS2645. EXCEPT RING.
5. SURFACE TEXTURE: SYMBOLS PER ANSI Y14.36-1978, REQUIREMENTS PER ANSI B46.1-1978. UNLESS OTHERWISE SPECIFIED, SURFACES TO BE 125 MICROINCHES (3.2 MICROMETRES).
6. DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.
7. BREAK SHARP EDGES .003-.015 (0.08-0.38) UNLESS OTHERWISE SPECIFIED.
8. DIMENSIONS IN INCHES, (MILLIMETRES), METRIC CONVERSIONS IN PARENTHESIS ARE IN INTERNATIONAL SYSTEMS UNITS (SI).
9. DIMENSIONS APPLY WHEN LOCKRING IS AGAINST STOP TOWARD .3125-24 THREAD.
10. MARK AEROSPACE STANDARD IDENTIFICATION NUMBER AND MANUFACTURER'S IDENTIFICATION ON CONTAINER.
11. DO NOT USE UNASSIGNED AEROSPACE STANDARD IDENTIFICATION NUMBERS.
12. INSTALLATION SHALL BE IN ACCORDANCE WITH AS1561.

SOURCE OF SUPPLY
ROSAN, INC.
NEWPORT BEACH, CALIFORNIA 92663
MANUFACTURER'S CODE IDENTIFICATION NUMBER 83324
DRAWING NUMBER SFC-SUM SERIES

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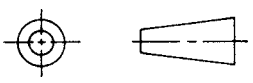
THIRD ANGLE PROJECTION



Prepared by SAE COMMITTEE E-25, Engine & Propeller Standard Utility Parts

SOURCE CONTROL DRAWING

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD IDENTIFICATION

STUD-STRAIGHT, RING LOCKED, CRES AMS5731
.3125-18 UNJC X .3125-24 UNJF

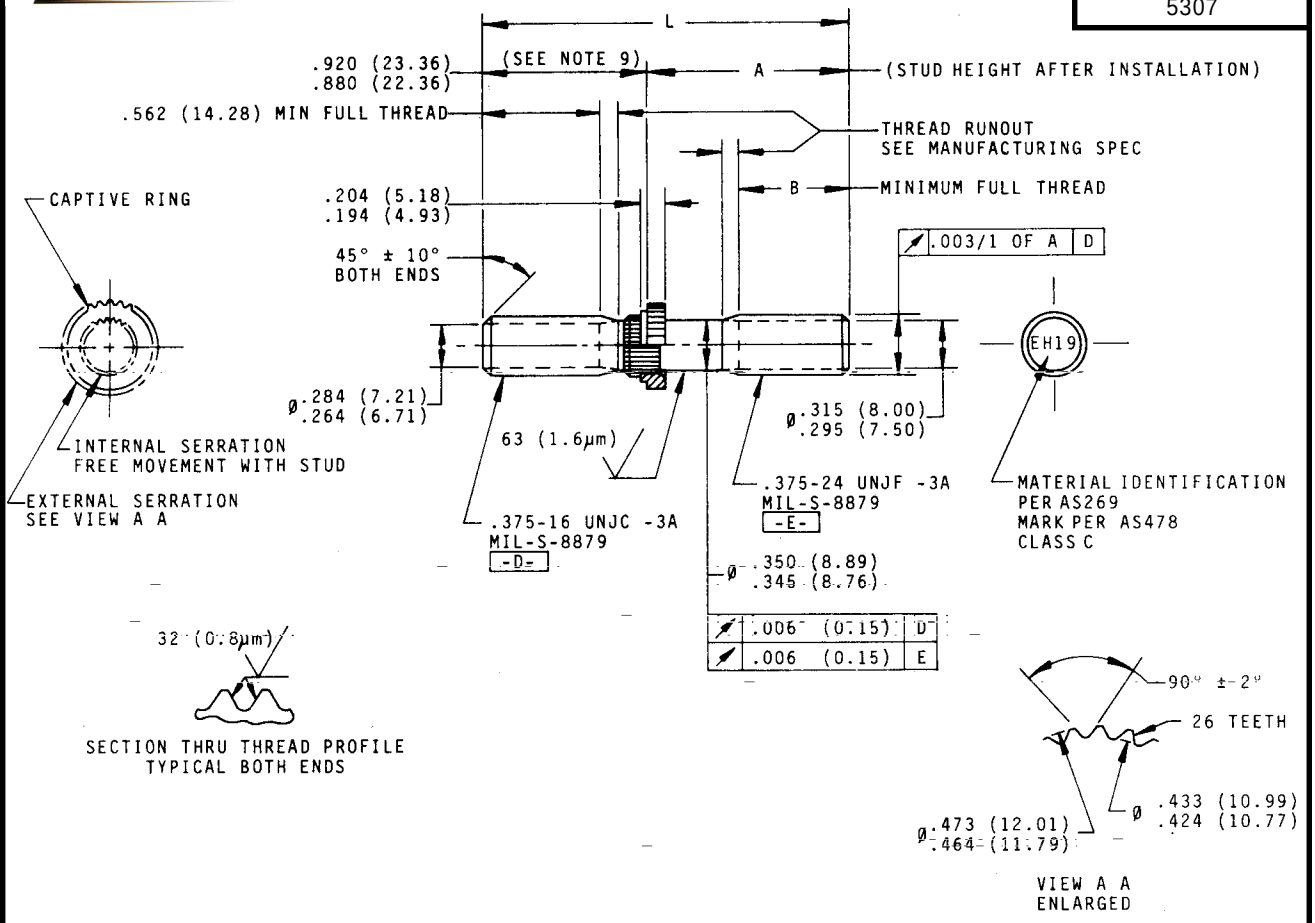
AS3321

SHEET 1 OF 2

AS IDENTIFICATION NUMBER	L REF		A (SEE NOTE 9)		B		APPROX MASS		VENDOR NUMBER
	IN.	(mm)	IN.	(mm)	IN.	(mm)	LB/100	kg/100	
AS3321-01	1.510	38.35	.735- .765	18.67-19.43	.493	12.52	2.82	1.28	SFC312SUM-12
AS3321-02	1.572	39.93	.797- .827	20.25-21.00	.555	14.09	2.94	1.34	SFC312SUM-13
AS3321-03	1.635	41.53	.860- .890	21.85-22.60	.617	15.67	3.07	1.39	SFC312SUM-14
AS3321-04	1.698	43.13	.923- .953	23.45-24.20	.680	17.27	3.20	1.45	SFC312SUM-15
AS3321-05	1.760	44.70	.985-1.015	25.02-25.78	.719	18.26	3.32	1.51	SFC312SUM-16
AS3321-06	1.822	46.28	1.047-1.077	26.60-27.35	.719	18.26	3.45	1.57	SFC312SUM-17
AS3321-07	1.885	47.88	1.110-1.140	28.20-28.95	.719	18.26	3.58	1.62	SFC312SUM-18
AS3321-08	1.948	49.48	1.173-1.203	29.80-30.55	.719	18.26	3.71	1.68	SFC312SUM-19
AS3321-09	2.010	51.05	1.235-1.265	31.37-32.13	.719	18.26	3.83	1.74	SFC312SUM-20
AS3321-10	2.072	52.63	1.297-1.327	32.95-33.70	.719	18.26	3.96	1.80	SFC312SUM-21
AS3321-11	2.135	54.23	1.360-1.390	34.55-35.30	.719	18.26	4.09	1.85	SFC312SUM-22
AS3321-12	2.198	55.83	1.423-1.453	36.15-36.90	.719	18.26	4.21	1.91	SFC312SUM-23
AS3321-13	2.260	57.40	1.485-1.515	37.72-38.48	.719	18.26	4.34	1.97	SFC312SUM-24
AS3321-14	2.322	58.98	1.547-1.577	39.30-40.05	.719	18.26	4.47	2.03	SFC312SUM-25
AS3321-15	2.385	60.58	1.610-1.640	40.90-41.65	.719	18.26	4.59	2.08	SFC312SUM-26
AS3321-16	2.448	62.18	1.673-1.703	42.50-43.25	.719	18.26	4.72	2.14	SFC312SUM-27
AS3321-17	2.510	63.75	1.735-1.765	44.07-44.83	.719	18.26	4.85	2.20	SFC312SUM-28
AS3321-18	2.572	65.33	1.797-1.827	45.65-46.40	.719	18.26	4.98	2.26	SFC312SUM-29
AS3321-19	2.635	66.93	1.860-1.890	47.25-48.00	.719	18.26	5.10	2.31	SFC312SUM-30
AS3321-20	2.698	68.53	1.923-1.953	48.85-49.60	.719	18.26	5.23	2.37	SFC312SUM-31
AS3321-21	2.760	70.10	1.985-2.015	50.42-51.18	.719	18.26	5.36	2.43	SFC312SUM-32
AS3321-22	2.885	73.28	2.110-2.140	53.60-54.35	.719	18.26	5.61	2.54	SFC312SUM-34
AS3321-23	3.010	76.45	2.235-2.265	56.77-57.53	.719	18.26	5.86	2.66	SFC312SUM-36
AS3321-24	3.135	79.63	2.360-2.390	59.95-60.70	.719	18.26	6.12	2.77	SFC312SUM-38
AS3321-25	3.260	82.80	2.485-2.515	63.12-63.88	.719	18.26	6.37	2.89	SFC312SUM-40
AS3321-26	3.385	85.98	2.610-2.640	66.30-67.05	.719	18.26	6.63	3.00	SFC312SUM-42
AS3321-27	3.510	89.15	2.735-2.765	69.47-70.23	.719	18.26	6.88	3.12	SFC312SUM-44
AS3321-28	3.635	92.33	2.860-2.890	72.65-73.40	.719	18.26	7.13	3.24	SFC312SUM-46
AS3321-29	3.760	95.50	2.985-3.015	75.82-76.58	.719	18.26	7.39	3.35	SFC312SUM-48
AS3321-30	3.885	98.68	3.110-3.140	79.00-79.75	.719	18.26	7.64	3.47	SFC312SUM-50

Fairchild Fasteners

FED SUPPLY CLASS
5307



1. MATERIAL: STUD - CORROSION AND HEAT RESISTANT STEEL, AMS5731.
   RING - CORROSION RESISTANT STEEL, AMS5640.
2. FINISH: STUD - NONE.
   RING - NONE.
3. MANUFACTURING SPECIFICATION: AMS7482, EXCEPT STRESS RUPTURE TEST IS WAIVED, AND STUD END THREAD REQUIREMENTS OF AS3062, INCOMPLETE LEAD AND RUNOUT THREADS, IS NOT APPLICABLE.
4. FLUORESCENT PENETRANT INSPECTION PER AMS2645. EXCEPT RING.
5. SURFACE TEXTURE: SYMBOLS PER ANSI Y14.36-1978, REQUIREMENTS PER ANSI B46.1-1978. UNLESS OTHERWISE SPECIFIED, SURFACES TO BE 125 MICROINCHES (3.2 MICROMETRES).
6. DIMENSIONING AND TOLERANCING: ANSI Y14.5-1973.
7. BREAK SHARP EDGES .003-.015 (0.08-0.38) UNLESS OTHERWISE SPECIFIED.
8. DIMENSIONS IN INCHES, (MILLIMETRES), METRIC CONVERSIONS IN PARENTHESIS ARE IN INTERNATIONAL SYSTEMS UNITS (SI).
9. DIMENSIONS APPLY WHEN LOCKRING IS AGAINST STOP TOWARD .375-24 THREAD.
10. MARK AEROSPACE STANDARD IDENTIFICATION NUMBER AND MANUFACTURER'S IDENTIFICATION ON CONTAINER.
11. DO NOT USE UNASSIGNED AEROSPACE STANDARD IDENTIFICATION NUMBERS.
12. INSTALLATION SHALL BE IN ACCORDANCE WITH AS1561.

SOURCE OF SUPPLY
ROSAN, INC.
NEWPORT BEACH, CALIFORNIA 92663
MANUFACTURER'S CODE IDENTIFICATION NUMBER 83324
DRAWING NUMBER SFC-SUM SERIES

IDENTIFICATION OF THE APPROVED SOURCE (S) HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEMS DESCRIBED ON THIS DRAWING.

ONLY THE ITEM DESCRIBED ON THIS DRAWING WHEN PROCURED FROM THE VENDOR LISTED HEREON IS APPROVED FOR USE IN THE APPLICATIONS SPECIFYING THIS AEROSPACE STANDARD IDENTIFICATION NUMBER. A SUBSTITUTE ITEM SHALL NOT BE USED WITHOUT PRIOR TESTING AND APPROVAL BY THE DESIGN ACTIVITY RESPONSIBLE FOR THE APPLICATION.

THIRD ANGLE PROJECTION

Prepared by SAE COMMITTEE E-25, Engine & Propeller Standard Utility Parts

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD IDENTIFICATION
STUD-STRAIGHT, RING LOCKED, CRES AMS5731
.250-20 UNJC X .250-28 UNJF

SOURCE CONTROL DRAWING

AS3322

Fairchild Fasteners

AS IDENTIFICATION NUMBER	L REF		A (SEE NOTE 9)		B		APPROX MASS		VENDOR NUMBER
	IN.	(mm)	IN.	(mm)	IN.	(mm)	LB/100	kg/100	
AS3322-01	1.712	43.48	.797- .827	20.25-21.00	.519	13.18	4.67	2.12	SFC375SUM-13
AS3322-02	1.775	45.08	.860- .890	21.85-22.60	.581	14.75	4.87	2.21	SFC375SUM-14
AS3322-03	1.838	46.68	.923- .953	23.45-24.20	.644	16.35	5.07	2.30	SFC375SUM-15
AS3322-04	1.900	48.26	.985-1.015	25.02-25.78	.707	17.95	5.25	2.38	SFC375SUM-16
AS3322-05	1.962	49.84	1.047-1.077	26.60-27.35	.769	19.53	5.42	2.46	SFC375SUM-17
AS3322-06	2.025	51.44	1.110-1.140	28.20-28.95	.831	21.10	5.62	2.55	SFC375SUM-18
AS3322-07	2.088	53.04	1.173-1.203	29.80-30.55	.894	22.70	5.82	2.64	SFC375SUM-19
AS3322-08	2.150	54.61	1.235-1.265	31.37-32.13	.938	23.82	6.00	2.72	SFC375SUM-20
AS3322-09	2.212	56.18	1.297-1.327	32.95-33.70	.938	23.82	6.17	2.80	SFC375SUM-21
AS3322-10	2.275	57.78	1.360-1.390	34.55-35.30	.938	23.82	6.37	2.89	SFC375SUM-22
AS3322-11	2.338	59.38	1.423-1.453	36.15-36.90	.938	23.82	6.57	2.98	SFC375SUM-23
AS3322-12	2.400	60.96	1.485-1.515	37.72-38.48	.938	23.82	6.75	3.06	SFC375SUM-24
AS3322-13	2.462	62.54	1.547-1.577	39.30-40.05	.938	23.82	6.92	3.14	SFC375SUM-25
AS3322-14	2.525	64.14	1.610-1.640	40.90-41.65	.938	23.82	7.12	3.23	SFC375SUM-26
AS3322-15	2.588	65.74	1.673-1.703	42.50-43.25	.938	23.82	7.32	3.32	SFC375SUM-27
AS3322-16	2.650	67.31	1.735-1.765	44.07-44.83	.938	23.82	7.50	3.40	SFC375SUM-28
AS3322-17	2.712	68.88	1.797-1.827	45.65-46.40	.938	23.82	7.67	3.48	SFC375SUM-29
AS3322-18	2.775	70.48	1.860-1.890	47.25-48.00	.938	23.82	7.87	3.57	SFC375SUM-30
AS3322-19	2.838	72.08	1.923-1.953	48.85-49.60	.938	23.82	8.07	3.66	SFC375SUM-31
AS3322-20	2.900	73.66	1.985-2.015	50.42-51.18	.938	23.82	8.24	3.74	SFC375SUM-32
AS3322-21	3.025	76.84	2.110-2.140	53.60-54.35	.938	23.82	8.62	3.91	SFC375SUM-34
AS3322-22	3.150	80.01	2.235-2.265	56.77-57.53	.938	23.82	8.99	4.08	SFC375SUM-36
AS3322-23	3.275	83.18	2.360-2.390	59.95-60.70	.938	23.82	9.37	4.25	SFC375SUM-38
AS3322-24	3.400	86.36	2.485-2.515	63.12-63.88	.938	23.82	9.74	4.42	SFC375SUM-40
AS3322-25	3.525	89.54	2.610-2.640	66.30-67.05	.938	23.82	10.12	4.59	SFC375SUM-42
AS3322-26	3.650	92.71	2.735-2.765	69.47-70.23	.938	23.82	10.49	4.76	SFC375SUM-44
AS3322-27	3.775	95.88	2.860-2.890	72.65-73.40	.938	23.82	10.87	4.93	SFC375SUM-46
AS3322-28	3.900	99.06	2.985-3.015	75.82-76.58	.938	23.82	11.24	5.10	SFC375SUM-48
AS3322-29	4.025	102.24	3.110-3.140	79.00-79.75	.938	23.82	11.62	5.27	SFC375SUM-50
AS3322-30	4.150	105.41	3-235-3.265	82.17-82.83	.938	23.82	11.99	5.44	SFC375SUM-52
AS3322-31	4.275	108.58	3.360-3.390	85.35-86.10	.938	23.82	12.37	5.61	SFC375SUM-54
AS3322-32	4.400	111.76	3.485-3.515	88-52-89.28	.938	23.82	12.74	5.78	SFC375SUM-56
AS3322-33	4.525	114.94	3.610-3.640	91.70-92.45	.938	23.82	13.12	5.95	SFC375SUM-58
AS3322-34	4.650	118.11	3.735-3.765	94.87-95.63	.938	23.82	13.49	6.12	SFC375SUM-60

Fairchild Fasteners

SAE The Engineering Resource For Advancing Mobility

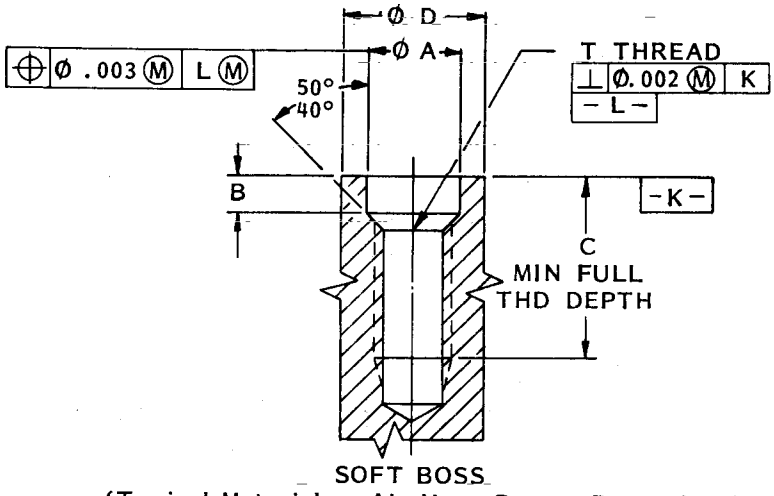
400 COMMOMWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD

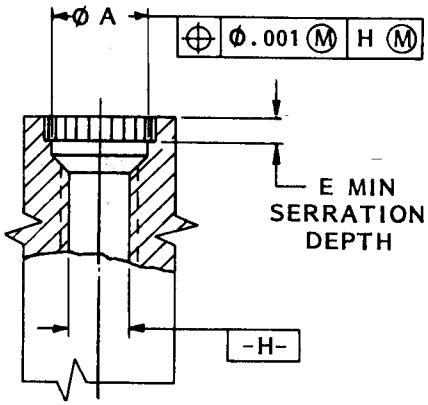
AS 1561

Issued 11-2-81
Revised

STUD, LOCKED IN - RING, STRAIGHT, INSTALLATION AND REMOVAL OF



SOFT BOSS
(Typical Materials: Al, Mag, Brass, Bronze)



HARD BOSS [4]
(Typical Materials: Steel, Ti and Heat Resistant Alloys)
[Same as soft boss except as shown]

BASIC STUD PART NUMBER	T THREAD MIL-S-8879 [4]			A	B	C	D	E SERRATION DEPTH
	SOFT MATERIALS UNJC-3B	HARD MATERIALS						
		UNJC-3B MOD	MOD MINOR DIA					
			+.0020 -.0010	+.003 -.000	+.020 -.000			
(REF)						MIN	MIN	MIN
AS 3319	.1900-24	.1900-24	.1520	.258	.101	.473	.340	.073
AS 3320	.2500-20	.2500-20	.2031	.337	.128	.623	.440	.099
AS 3321	.3125-18	.3125-18	.2610	.381	.169	.747	.500	.145
AS 3322	.3750-16	.3750-16	.3160	.448	.204	.880	.620	.181

1. Surface Texture: Symbols per ANSI Y14.36-1978, requirements per ANSI B46.1-1978. Unless otherwise specified, surfaces to be 125 microinches.
2. Dimensioning and tolerancing in accordance with ANSI Y14.5-1973.
3. Break sharp edges .003-.015 unless otherwise specified.

[4] Hard materials (Steel, Ti and Heat Resistant Alloys) require the modified minor diameter shown and broached serrations in counterbore area, see AS 1561.

5. Dimensions in Inches.
6. Nominal Use: For installation of ring locked straight studs AS 3319 thru AS 3322.
7. For design, installation and removal of ring locked straight studs, see AS 1561.
8. This is a Design Standard not to be used as a part number.

PREPARED BY
SAE COMMITTEE E-25, ENGINE & PROPELLER STANDARD UTILITY PARTS

Fairchild Fasteners

SAE The Engineering Resource For Advancing Mobility

400 COMMOMWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE STANDARD

AS 1561

Issued 11-2-81
Revised

STUD, LOCKED IN - RING, STRAIGHT, INSTALLATION AND REMOVAL OF

1. PURPOSE AND SCOPE

1.1 This Aerospace Standard provides minimum design, installation and removal requirements for AS 3319 thru AS 3322 studs and is applicable when specified on engineering drawings, or in procurement documents.

2. GENERAL DESIGN INFORMATION

2.1 These straight studs are ring locked to prevent the stud from rotating during service and while assembling or removing the nut. The stud shear engagement area to resist tensile loads is shown in Table I.

2.2 Dimensioning in inches.

2.3 Studs AS 3319 thru AS 3322 are to be installed per this document into stud holes prepared Per AS 1620.

2.4 Installed stud will have "A" projection above the boss equivalent to the "A" dimension on the stud drawing as shown in AS 3319 thru AS 3322.

2.5 When ring lock studs are installed in soft boss materials (Al, Mag, Brass, Bronze, etc.) the lockring is of sufficient hardness for its external serrations to broach their own way into the boss. When studs are installed in hard boss materials (Steel, Ti, Heat Resistant alloy, etc.) it will be necessary to broach serrations in the counterbore area prior to stud installation.

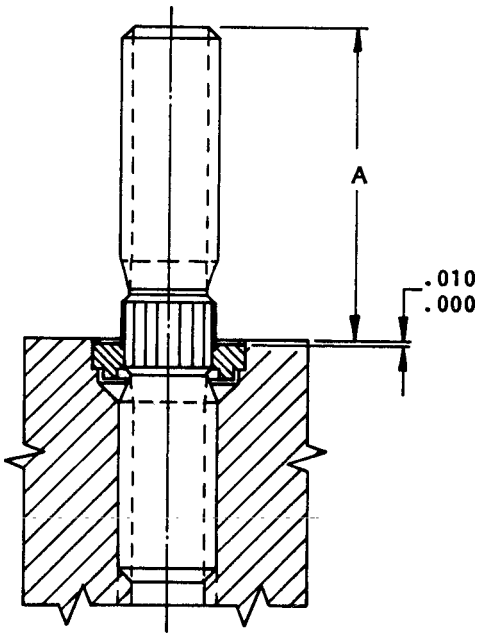


FIGURE 1

TABLE I

BASIC STUD PART NUMBER (REF)	THREAD MINIMUM SHEAR ENGAGEMENT AREA IN???2 1/
AS 3319	.1142
AS 3320	.2075
AS 3321	.3331
AS 3322	.4891

1/ The thread minimum shear engagement area is the axial thread shear area of the stud that must resist thread stripping due to tensile loads applied to the stud. It does not represent a dimension of either of the members in an unassembled condition.

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3. DESIGN REQUIREMENTS

3.1 Minimum data to be specified on engineering drawing or specification.

3.1.1 Boss diameter to be at least the minimum specified in AS 1620.

3.1.2 Location of holes and thread size. If tap drill depth is not thru, specify control depth dimensions.

3.1.3 Applicable stud part number (AS 3319 thru AS 3322).

3.1.4 Install stud per AS 1561.

3.1.5 If material requires a corrosion protective coating, so specify.

4. INSTALLATION OF STUD

4.1 Installation into AS 1620 SOFT BOSS (Al, Mag, Brass, Bronze).

4.1.1 Apply a corrosion protective coating in the prepared hole if applicable (see 3.1.5).

4.1.2 Screw the stud into the prepared hole by hand until the lockring contacts the top of boss and the top of lockring bears against the stud serration stop (Figure 2). This will automatically provide the proper stud projection "A" (Figure 1).

4.1.3 Using the applicable lockring drive tool shown in Table II, drive the lockring into the counter bore until the face of the tool bears against the boss surface. The lockring will be installed flush to .010 below the boss surface per Figures 1 & 2.

4.1.4 When applicable, wipe away excess corrosion protective coating from the boss surface.

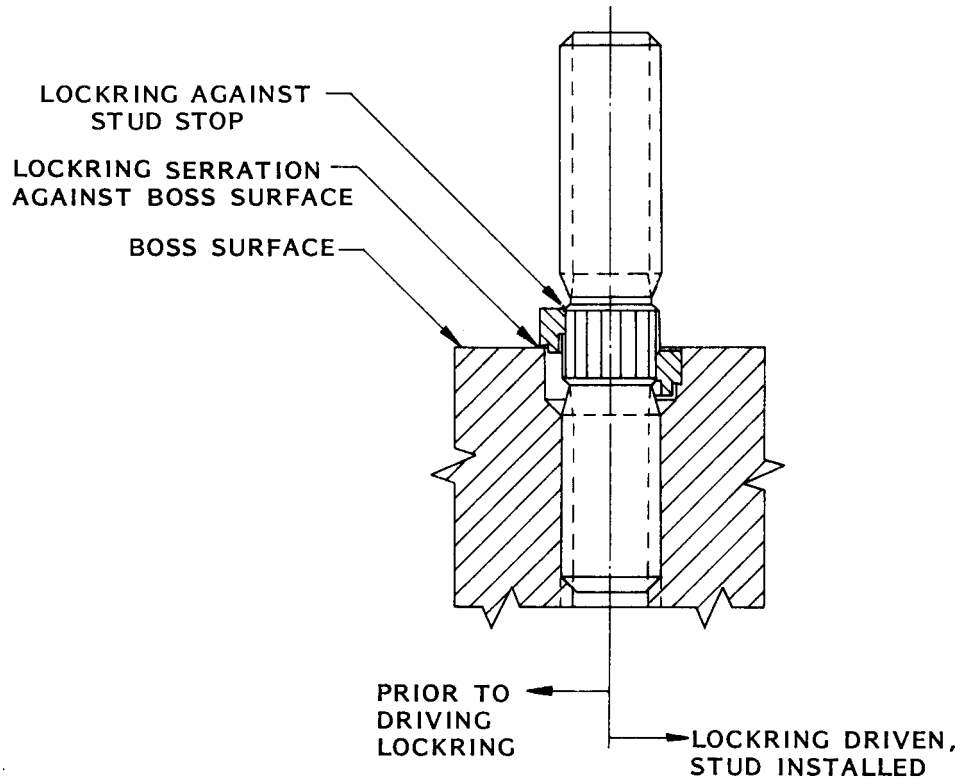


FIGURE 2

TABLE II TOOLING

BASIC STUD NUMBER (REF)	BOSS THREAD SIZE (REF)	LOCKRING DRIVE TOOL 2/	MANUAL BROACH TOOL 1/ 2/	WOBBLE BROACH (SEE 4.2.1.4) 1/ 2/
AS 3319	.190-24	SFC19D16	SFCPB190	SFC190WB
AS 3320	.250-20	SFC25D16	SFCPB250	SFC250WB
AS 3321	.3125-18	SFC31D16	SFCPB312	SFC312WB
AS 3322	.375-16	SFC38D16	SFCPB375	SFC375WB

1/ Manual broach tool will broach serrations in most materials having a hardness of up to 40 HRC. For harder materials, electrical discharge broach tools are available.

2/ Source of supply: Rosán, Inc., Newport Beach, CA 92663. FSCM No. 83324.

4.2 Installation into AS 1620 HARD BOSS (Steel, Ti and Heat Resistant Alloys).

4.2.1 Pre-broach counterbore area (Figure 3).

4.2.1.1 The Modified Minor Diameter of the boss thread (AS 1620) acts as a guide bushing for the broach tool pilot to maintain the concentricity of the tapped hole with the broached serrations.

4.2.1.2 Select the applicable manual broach tool per Table II and back off nut from top of body approximately .250 inch. Place the tool pilot into the tapped hole and apply sufficient force to the top of mandrel to allow the cutter to broach into the counterbore. When the external shoulder of the mandrel contacts the internal shoulder of the tool body, broaching is complete. Screw the nut down against the body. Apply a wrench to the nut and continue turning until the cutter is jacked out of the boss. Remove chips.

4.2.1.3 The depth of the broached serrations are to be per Table III & Figure 3.

4.2.1.4 For a production type machining setup, the wobble broach tool shown in Table II is recommended.

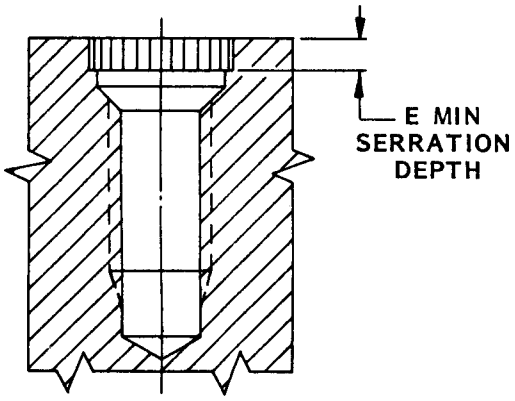


FIGURE 3 - AS 1620 HARD BOSS

TABLE III

STUD BASIC NUMBER	BOSS THREAD SIZE (REF)	E MIN SERRATION DEPTH
AS 3319	.190-24	.073
AS 3320	.250-20	.099
AS 3321	.3125-18	.145
AS 3322	.375-16	.181

4.2.2 Stud installed in pre-broached materials and reinstallation of studs in bosses of any material.

4.2.2.1 Apply corrosion protective coating in the prepared hole if applicable (see 3.1.5).

4.2.2.2 A .002 maximum thickness shim shall be used between the lockring and the broached surface to prevent premature engagement of serrations. Screw the stud into the prepared hole until the top of the lockring has stopped against the upper part of the stud serrations and the lower points of the lockring external serrations rest on the shim surface. This will automatically provide the proper stud projection (Figures 1 & 2).

4.2.2.3 Remove shim. If the lockring external serrations align with the serrations in the counterbore, drive the lockring using the applicable lockring drive tool (Table II). If the serrations do not alight turn the stud clockwise until they do, then drive the lockring. The lockring will be installed flush to .010 below the boss surface per Figure 1.

4.2.2.4 When applicable, wipe away excess corrosion protective coating from the boss surface.

5. STUD REMOVAL

5.1 CAUTION: The AS 3319 thru AS 3322 Studs were designed with a small external diameter lockring to allow their usage in locations where edge distance is a problem. The lockring is too small in diameter to use a typical hollow-mill tool (normally used in removing ring-locked step studs) since the milling tool would be too thin to take the cutting loads.

5.2 The following removal method is suggested.

5.2.1 Cut the stud off approximately flush with the surface of the parent material.

5.2.2 Mark the center of the remaining stud by use of a center punch.

5.2.3 Locate the noted drill (No. 1 in Table IV) directly over the center of the part and drill into the stud to depth shown.

5.2.4 Center the larger drill (No. 2 in Table IV) over the small hole and drill to depth shown. This will remove the engagement between the stud serrations and the internal serrations of the lockring.

5.2.5 The remaining lockring will have a very thin wall. A sharp punch will easily break it away from the parent material. Remove all pieces of the lockring.

5.2.6 Drive a screw extractor into the small hole in the stud and apply a counterclockwise torque to remove the remaining stud portion.

5.2.7 Clean the hole.

TABLE IV

BASIC STUD NO.	#1 REMOVAL DRILL		#2 REMOVAL DRILL	
	DIAMETER	MIN DEPTH	DIAMETER	DEPTH ±.015
AS 3319	.062	.250	.219	.090
AS 3320	.093	.250	.297	.105
AS 3321	.125	.312	.339	.120
AS 3322	.125	.375	.406	.120

6. STUD REINSTALLATION

6.1 These studs are unique in that the same size stud can be reinstalled. Use the same part number as specified on the original equipment.

6.2 Reinstall the new stud as described in 4.2.2.

TOOLING FOR AS3319 THRU AS3322 STUDS

BASIC AS STUD NUMBER	BASIC ROSÁN STUD NUMBER	TOOLING NUMBERS		
		STEP DRILL [1]	LOCKRING DRIVER	BROACH TOOL FOR APPLICATIONS IN HARD MATERIALS
AS3319	SFC190	SFC190SD	SFC19D16	SFCPB190
AS3320	SFC250	SFC250SD	SFC25D16	SFCPB250
AS3321	SFC312	SFC312SD	SFC31D16	SFCPB312
AS3322	SFC375	SFC375SD	SFC38D16	SFCPB375

NOTES: UNLESS OTHERWISE SPECIFIED

[1] Standard step drill provides hole depth greater than minimum shown in SFC series hole preparation data. Alter step length for minimum depth drilling as required.

INTERCHANGEABILITY TABLES AS VERSUS ROSÁN

A S PART NUMBER	ROSÁN PART NUMBER
AS3319-01	SFC190SUM-8
AS3319-02	SFC190SUM-9
AS3319-03	SFC190SUM-10
AS3319-04	SFC190SUM-11
AS3319-05	SFC190SUM-12
AS3319-06	SFC190SUM-13
AS3319-07	SFC190SUM-14
AS3319-08	SFC190SUM-15
AS3319-09	SFC190SUM-16
AS3319-10	SFC190SUM-17
AS3319-11	SFC190SUM-18
AS3320-01	SFC250SUM-9
AS3320-02	SFC250SUM-10
AS3320-03	SFC250SUM-11
AS3320-04	SFC250SUM-12
AS3320-05	SFC250SUM-13
AS3320-06	SFC250SUM-14
AS3320-07	SFC250SUM-15
AS3320-08	SFC250SUM-16
AS3320-09	SFC250SUM-17
AS3320-10	SFC250SUM-18
AS3320-11	SFC250SUM-19
AS3320-12	SFC250SUM-20
AS3320-13	SFC250SUM-21
AS3320-14	SFC250SUM-22
AS3320-15	SFC250SUM-23
AS3320-16	SFC250SUM-24
AS3320-17	SFC250SUM-25
AS3320-18	SFC250SUM-26
AS3320-19	SFC250SUM-27
AS3320-20	SFC250SUM-28
AS3320-21	SFC250SUM-29
AS3320-22	SFC250SUM-30
AS3320-23	SFC250SUM-31
AS3320-24	SFC250SUM-32
AS3320-25	SFC250SUM-34
AS3320-26	SFC250SUM-36
AS3320-27	SFC250SUM-38
AS3320-28	SFC250SUM-40
AS3320-29	SFC250SUM-42
AS3320-30	SFC250SUM-44
AS3321-01	SFC312SUM-12
AS3321-02	SFC312SUM-13
AS3321-03	SFC312SUM-14
AS3321-04	SFC312SUM-15
AS3321-05	SFC312SUM-16
AS3321-06	SFC312SUM-17
AS3321-07	SFC312SUM-18
AS3321-08	SFC312SUM-19
AS3321-09	SFC312SUM-20
AS3321-10	SFC312SUM-21
AS3321-11	SFC312SUM-22
AS3321-12	SFC312SUM-23

A S PART NUMBER	ROSÁN PART NUMBER
AS3321-13	SFC312SUM-24
AS3321-14	SFC312SUM-25
AS3321-15	SFC312SUM-26
AS3321-16	SFC312SUM-27
AS3321-17	SFC312SUM-28
AS3321-18	SFC312SUM-29
AS3321-19	SFC312SUM-30
AS3321-20	SFC312SUM-31
AS3321-21	SFC312SUM-32
AS3321-22	SFC312SUM-34
AS3321-23	SFC312SUM-36
AS3321-24	SFC312SUM-38
AS3321-25	SFC312SUM-40
AS3321-26	SFC312SUM-42
AS3321-27	SFC312SUM-44
AS3321-28	SFC312SUM-46
AS3321-29	SFC312SUM-48
AS3321-30	SFC312SUM-50
AS3322-01	SFC375SUM-13
AS3322-02	SFC375SUM-14
AS3322-03	SFC375SUM-15
AS3322-04	SFC375SUM-16
AS3322-05	SFC375SUM-17
AS3322-06	SFC375SUM-18
AS3322-07	SFC375SUM-19
AS3322-08	SFC375SUM-20
AS3322-09	SFC375SUM-21
AS3322-10	SFC375SUM-22
AS3322-11	SFC375SUM-23
AS3322-12	SFC375SUM-24
AS3322-13	SFC375SUM-25
AS3322-14	SFC375SUM-26
AS3322-15	SFC375SUM-27
AS3322-16	SFC375SUM-28
AS3322-17	SFC375SUM-29
AS3322-18	SFC375SUM-30
AS3322-19	SFC375SUM-31
AS3322-20	SFC375SUM-32
AS3322-21	SFC375SUM-34
AS3322-22	SFC375SUM-36
AS3322-23	SFC375SUM-38
AS3322-24	SFC375SUM-40
AS3322-25	SFC375SUM-42
AS3322-26	SFC375SUM-44
AS3322-27	SFC375SUM-46
AS3322-28	SFC375SUM-48
AS3322-29	SFC375SUM-50
AS3322-30	SFC375SUM-52
AS3322-31	SFC375SUM-54
AS3322-32	SFC375SUM-56
AS3322-33	SFC375SUM-58
AS3322-34	SFC375SUM-60

DEPARTMENT OF DEFENSE STANDARDS (METRIC)

INDEX

Fairchild Fasteners

Metric

DOD-S-63275/1A
29 October 1982
SUPERSEDING
DOD-S-63275/1
26 September 1977

METRIC

MILITARY SPECIFICATION SHEET

STUD, SCREW THREAD, LOCKED IN, RING LOCKED, SERRATED, METRIC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for acquiring the stud described herein shall consists of this specification and the latest issue of specification DOD-S-63275.

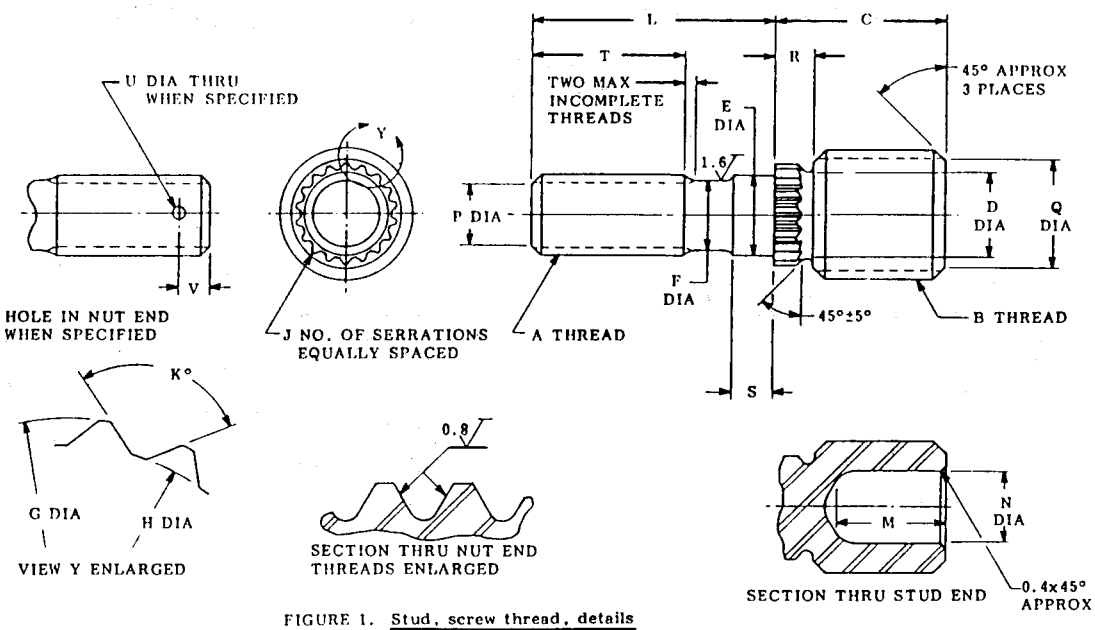


FIGURE 1. Stud, screw thread, details

NOTES:

1. Dimensions are in millimeters, to be met after plating.
2. Concentricity: Shank of nut end shall be concentric with serrated collar within 0.15 FIM.
3. Fillets shall be 0.4 R maximum.
4. Edges shall be broken 0.1 - 0.4 unless otherwise specified.

TABLE I. Part dimensions, short stud end length

DASH NO.	A NUT END THREAD SIZE (SEE REQT 5)	B STUD END THREAD	C ±0.45	D DIA MIN	E DIA +0.0 -0.2	F DIA APPROX	G DIA +0.0 -0.2	H DIA MAX	J	K° +2° -1°	M REF	N DIA APPROX	P DIA ±0.2	Q DIA ±0.2	R ±0.3	S ±0.5	T MIN	U DIA +0.1 -0.0	V +0.0 -0.3	BASIC LOCKRING
101	5x0.8	M8x1.25	9.3	4.72	5.0	4.5	6.02	5.26	13	102°	5.5	4.0	3.68	6.07	2.8	2.5	12.0	1.0	1.0	DOD-I-63276/2-1
102	6x1	M10x1.5	10.8	5.65	6.0	5.3	7.40	6.57	17	86°	6.0	5.5	4.40	7.73	3.4	3.0	14.0	1.5	2.8	DOD-I-63276/2-2
103	7x1	M12x1.5	12.3	7.57	7.0	6.3	9.45	8.51	17	99°	6.5	7.5	5.40	9.73	4.0	3.5	15.0	1.5	2.8	DOD-I-63276/2-3
104	8x1.25	M12x1.5	14.5	7.57	8.0	7.2	9.45	8.51	17	99°	9.0	6.5	6.07	9.73	4.0	4.0	18.0	2.0	3.5	DOD-I-63276/2-3
105	8x1	M12x1.5	14.5	7.57	8.0	7.3	9.45	8.51	17	99°	9.0	6.5	6.40	9.73	4.0	4.0	18.0	2.0	3.5	DOD-I-63276/2-3
106	10x1.5	M14x1.5	18.0	9.48	10.0	9.0	11.61	10.59	21	97°	12.0	6.7	7.73	11.73	4.6	5.0	20.0	2.0	3.5	DOD-I-63276/2-4
107	10x1.25	M14x1.5	18.0	9.48	10.0	9.2	11.61	10.59	21	97°	12.0	6.7	8.07	11.73	4.6	5.0	20.0	2.0	3.5	DOD-I-63276/2-4
108	12x1.5	M16x1.5	22.5	11.48	12.0	11.0	13.21	12.22	24	96°	15.0	7.5	9.73	13.73	5.6	6.0	22.0	3.0	4.5	DOD-I-63276/2-5
109	12x1.25	M16x1.5	22.5	11.48	12.0	11.2	13.21	12.22	24	96°	15.0	7.5	10.06	13.73	5.6	6.0	22.0	3.0	4.5	DOD-I-63276/2-5
110	14x1.5	M20x1.5	24.0	13.48	14.0	13.0	15.45	14.48	26	111°	15.5	11.5	11.73	17.73	6.0	7.0	24.0	3.0	5.0	DOD-I-63276/2-6

TABLE II. Part dimensions, long stud end length

DASH NO.	A NUT END THREAD SIZE (SEE REQT 5)	B STUD END THREAD	C ±0.45	D DIA MIN	E DIA +0.0 -0.2	F DIA APPROX	G DIA +0.0 -0.2	H DIA MAX	J	K° +2° -1°	M REF	N DIA APPROX	P DIA ±0.2	Q DIA ±0.2	R ±0.3	S ±0.5	T MIN	U DIA +0.1 -0.0	V +0.0 -0.3	BASIC LOCKRING
201	5x0.8	M8x1.25	12.2	4.72	5.0	4.5	6.02	5.26	13	102°	8.5	4.0	3.68	6.07	2.8	2.5	12.0	1.0	1.9	DOD-I-63276/2-1
202	6x1	M10x1.5	14.1	5.65	6.0	5.3	7.40	6.57	17	86°	9.5	5.5	4.40	7.73	3.4	3.0	14.0	1.5	2.8	DOD-I-63276/2-2
203	7x1	M12x1.5	16.2	7.57	7.0	6.3	9.45	8.51	17	99°	10.5	7.5	5.40	9.73	4.0	3.5	15.0	1.5	2.8	DOD-I-63276/2-3
204	8x1.25	M12x1.5	19.8	7.57	8.0	7.2	9.45	8.51	17	99°	14.5	6.5	6.07	9.73	4.0	4.0	18.0	2.0	3.5	DOD-I-63276/2-3
205	8x1	M12x1.5	19.8	7.57	8.0	7.3	9.45	8.51	17	99°	14.5	6.5	6.40	9.73	4.0	4.0	18.0	2.0	3.5	DOD-I-63276/2-3
206	10x1.5	M14x1.5	25.1	9.48	10.0	9.0	11.61	10.59	21	97°	19.0	6.7	7.73	11.73	4.6	5.0	20.0	2.0	3.5	DOD-I-63276/2-4
207	10x1.25	M14x1.5	25.1	9.48	10.0	9.2	11.61	10.59	21	97°	19.0	6.7	8.07	11.73	4.6	5.0	20.0	2.0	3.5	DOD-I-63276/2-4
208	12x1.5	M16x1.5	31.9	11.48	12.0	11.0	13.21	12.22	24	96°	24.5	7.5	9.73	13.73	5.6	6.0	22.0	3.0	4.5	DOD-I-63276/2-5
209	12x1.25	M16x1.5	31.9	11.48	12.0	11.2	13.21	12.22	24	96°	24.5	7.5	10.06	13.73	5.6	6.0	22.0	3.0	4.5	DOD-I-63276/2-5
210	14x1.5	M20x1.5	34.2	13.48	14.0	13.0	15.45	14.48	26	111°	26.0	11.5	11.73	17.73	6.0	7.0	24.0	3.0	5.0	DOD-I-63276/2-6

TABLE III. Available nut end lengths, mass values

AVAILABLE NUT END LENGTHS 1/ L	MASS kg/1000 PIECES APPROX 2/													
	M5x0.8		M6x1		M7x1		M8x1.25 M8x1		M10x1.5 M10x1.25		M12x1.5 M12x1.25		M14x1.5	
	101	201	102	202	103	203	104 105	204 205	106 107	206 207	108 109	208 209	110	210
18	4.05	4.64	—	—	—	—	—	—	—	—	—	—	—	—
20	4.29	4.88	6.72	7.70	—	—	—	—	—	—	—	—	—	—
22	4.53	5.12	7.06	8.04	9.84	11.3	—	—	—	—	—	—	—	—
25	4.89	5.48	7.57	8.55	10.60	12.0	14.8	17.3	—	—	—	—	—	—
28	5.25	5.84	8.09	9.07	11.30	12.7	15.8	18.2	28.4	32.8	—	—	—	—
30	5.49	6.08	8.43	9.41	11.80	13.2	16.4	18.8	29.4	33.8	—	—	—	—
(32)	5.73	6.32	8.77	9.75	12.30	13.7	17.0	19.4	30.4	34.8	47.4	57.1	—	—
35	6.09	6.68	9.29	10.30	13.00	14.4	17.9	20.4	31.8	36.3	49.6	59.3	71.7	85.7
(38)	6.45	7.04	9.80	10.80	13.70	15.1	18.9	21.3	33.3	37.8	51.8	61.5	74.8	88.8
40	6.69	7.28	10.20	11.10	14.20	15.6	19.5	22.0	34.3	38.8	53.3	63.0	76.9	90.9
(42)	6.93	7.52	10.50	11.50	14.70	16.1	20.1	22.6	35.3	39.7	54.8	64.5	78.9	92.9
45	7.29	7.88	11.00	12.00	15.40	16.8	21.1	23.5	36.8	41.2	57.0	66.7	82.0	96.0
(48)	7.65	8.24	11.50	12.50	16.20	17.6	22.0	24.4	38.3	42.7	59.2	68.9	85.1	99.1
50	7.89	8.48	11.90	12.80	16.60	18.1	22.6	25.1	39.2	43.7	60.7	70.4	87.2	101.0
(52)	8.13	8.72	12.20	13.20	17.10	18.5	23.2	25.7	40.2	44.7	62.2	71.9	89.3	103.0
55	8.49	9.08	12.70	13.70	17.90	19.3	24.2	26.6	41.7	46.2	64.4	74.1	92.4	106.0
(58)	8.85	9.44	13.20	14.20	18.60	20.0	25.1	27.6	43.2	47.6	66.6	76.3	95.5	109.0
60	9.09	9.68	13.60	14.60	19.10	20.5	25.8	28.2	44.2	48.6	68.1	77.8	97.6	112.0
(62)	9.33	9.92	13.90	14.90	19.60	21.0	26.4	28.8	45.2	49.6	69.6	79.3	99.6	114.0
65	9.69	10.30	14.30	15.40	20.30	21.7	27.3	29.8	46.6	51.1	71.8	81.5	103.0	117.0
(68)	10.10	10.60	14.90	15.90	21.00	22.4	28.2	30.7	48.1	52.6	74.0	83.7	106.0	120.0
70	10.30	10.90	15.30	16.30	21.50	22.9	28.9	31.3	49.1	53.5	75.5	85.2	108.0	122.0
(72)	10.50	11.10	15.60	16.60	22.00	23.4	29.5	32.0	50.1	54.5	77.0	86.7	110.0	124.0
75	10.90	11.50	16.10	17.10	22.70	24.1	30.4	32.9	51.6	56.0	79.2	88.9	113.0	127.0
(78)	11.20	11.80	16.70	17.60	23.40	24.9	31.4	33.8	53.0	57.5	81.4	91.1	116.0	130.0
80	11.50	12.10	17.00	18.00	23.00	25.4	32.0	34.4	54.0	58.5	82.9	92.6	118.0	132.0
85	—	—	17.90	18.80	25.10	26.6	33.6	36.0	56.5	60.9	86.6	96.3	123.0	137.0
90	—	—	18.70	19.70	26.40	27.8	35.1	37.6	59.0	63.4	90.3	100.0	129.0	143.0
95	—	—	—	—	27.60	29.0	36.7	39.1	61.4	65.9	94.0	104.0	134.0	148.0
100	—	—	—	—	28.80	30.2	38.2	40.7	63.9	68.3	97.7	107.0	139.0	153.0
105	—	—	—	—	—	—	39.8	42.3	66.4	70.8	101.0	111.0	144.0	158.0
110	—	—	—	—	—	—	41.4	43.8	68.8	73.3	105.0	115.0	149.0	163.0

Sizes shown in brackets are non-standard lengths

1/ Lengths over 110mm increase in increments of 5mm

2/ Calculated with 7.9 kg/mm^3

REQUIREMENTS:

1. Material: Steel, alloy, composition 8740 (UNS G87400) per AMS 6322. Nickel base alloy, corrosion and heat resistant composition 718 (UNS N07718) per AMS 5662. (See material code letters per Requirement 4).

2. Protective coating or treatment: Steel, UNS G87400 Code A shall be cadmium plated per general specification. Steel, UNS N07718, Code B shall be cleaned and descaled per general specification.

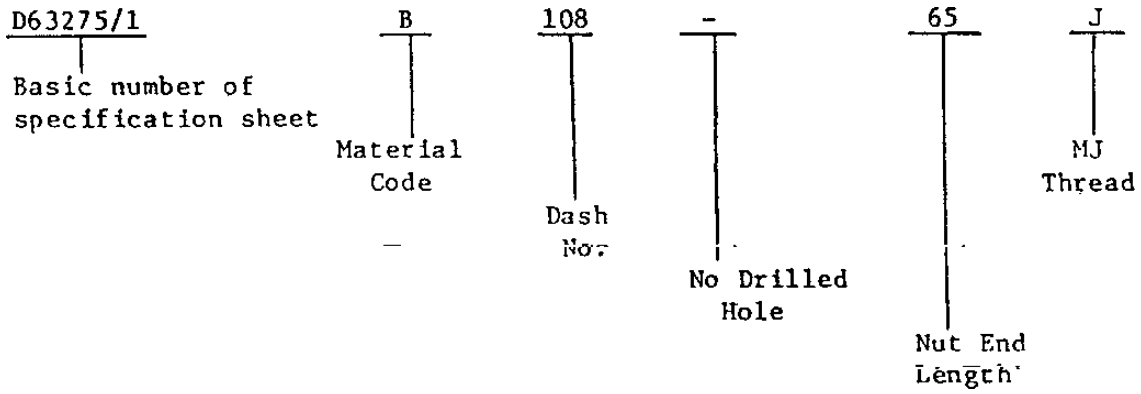
3. Surface texture: 3.2 µm except serrations.

4. Mechanical properties:

Material Code Letter	Material	Hardness, Min.	Min. Tensile Strength MPa	Dash Numbers
A	Steel, Alloy, Comp. 8740	28HRC	900	-101 thru -110 &-201 thru -210
B	Nickel Base Alloy, Comp. 718	40HRC	1250	-101 thru -110

5. Military part number: Consists of the letter D, plus the basic number of the specification sheet, plus material code (A or B) plus dash number from Table I or Table II, plus letter D for drilled hole in nut end or use dash if no drilled hole is required, plus nut end length per Table III, plus letter J for MJ thread on nut end or leave blank if M thread is specified

Example of Military part number:



Explanation of part number example:

Stud, nickel base alloy, MJ12x1.5 thread size, no drilled hole in nut end, and 65mm nut end length.

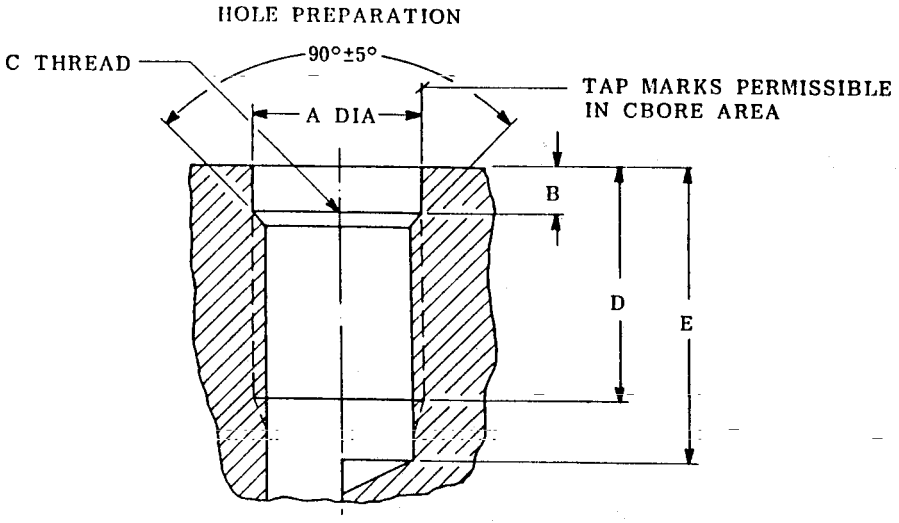


FIGURE 2. Parent material hole

TABLE IV. Parent material hole dimensions

NOMINAL NUT END THD SIZE OF STUD	STUD DASH NUMBER	A DIA	B +0.4 -0.0	C THREAD -4H5H	D MIN FULL THREAD DEPTH	E MIN RECMD DRILL DEPTH BLIND HOLE
M5x0.8	101	8.80- 8.90	2.4	M8x1.25	10.2	13.6
M5x0.8	201	8.80- 8.90	2.4	M8x1.25	13.1	16.5
M6x1	102	10.00-10.13	3.0	M10x1.5	11.7	15.3
M6x1	202	10.00-10.13	3.0	M10x1.5	15.0	18.6
M7x1	103	12.00-12.13	4.0	M12x1.5	13.2	16.8
M7x1	203	12.00-12.13	4.0	M12x1.5	17.1	20.7
M8x1.25	104	12.00-12.13	4.0	M12x1.5	15.4	19.0
M8x1.25	204	12.00-12.13	4.0	M12x1.5	20.7	24.3
M8x1	105	12.00-12.13	4.0	M12x1.5	15.4	19.0
M8x1	205	12.00-12.13	4.0	M12x1.5	20.7	24.3
M10x1.5	106	14.00-14.15	4.7	M14x1.5	18.9	22.5
M10x1.5	206	14.00-14.15	4.7	M14x1.5	26.0	29.6
M10x1.25	107	14.00-14.15	4.7	M14x1.5	18.9	22.5
M10x1.25	207	14.00-14.15	4.7	M14x1.5	26.0	29.6
M12x1.5	108	16.00-16.15	5.7	M16.1.5	23.4	27.0
M12x1.5	208	16.00-16.15	5.7	M16x1.5	32.8	36.4
M12x1.25	109	16.00-16.15	5.7	M16x1.5	23.4	27.0
M12x1.25	209	16.00-16.15	5.7	M16x1.5	32.8	36.4
M14x1.5	110	20.00-20.18	6.0	M20x1.5	24.9	28.5
M14x1.5	210	20.00-20.18	6.0	M20x1.5	35.1	38.7

NOTES:
1. Diameter “A” and thread shall be concentric within 0.1 FIM.
2. Axis of hole shall be normal to entry surface or provide spot face when required.
3. Machined surfaces shall be 3.2 µm in accordance with ANSI B46.1.
4. Dimensions are in millimeters.

5. Stud installation procedure.

5.1 Wrench stud to depth as shown in figure 3.

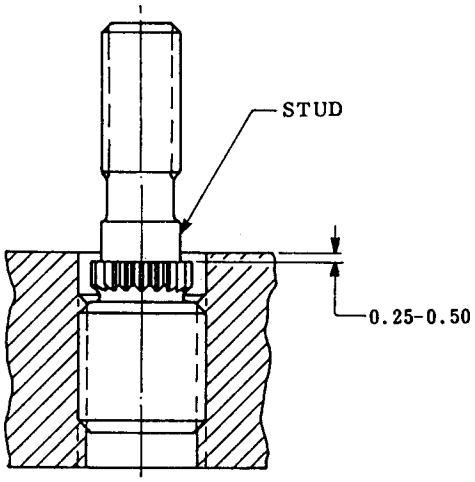


FIGURE 3. Stud wrenched-in

5.2 Drive lockring to depth shown in figure 4.

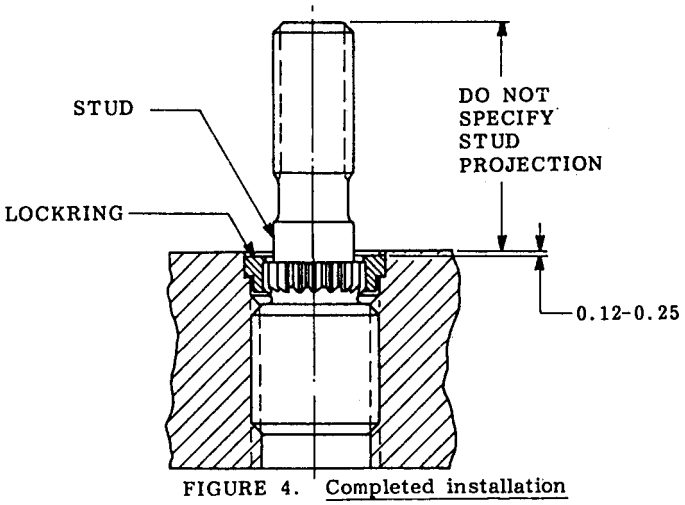


FIGURE 4. Completed installation

5.3 Replacement of studs is made with same size parts as those removed and in same manner as originally installed. Rotate new lockring if necessary, before driving, to a position in which the external serrations are aligned with those in parent material.

5.4 Use of manufacturers installation tools mandatory (Rosan, Inc. Newport Beach, CA - FSCM 83324).

Revision letters are not used to denote changes due to the extensiveness of the changes.

Custodians:
Army - AR
Navy - AS

Preparing activity:
Army - AR

Project No. 5307-0321

Review activities:
Army - AT, AV, MI, ER, CR
Navy - SH
NSA - NS
DLA - IS

User activities:
Army - ME
Navy - OS, MC

MILITARY SPECIFICATION SHEET
RING, LOCK, SERRATED, METRIC

The complete requirements for procuring the ring described herein shall consist of this document and the latest issue of specification DOD-I-63276.

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

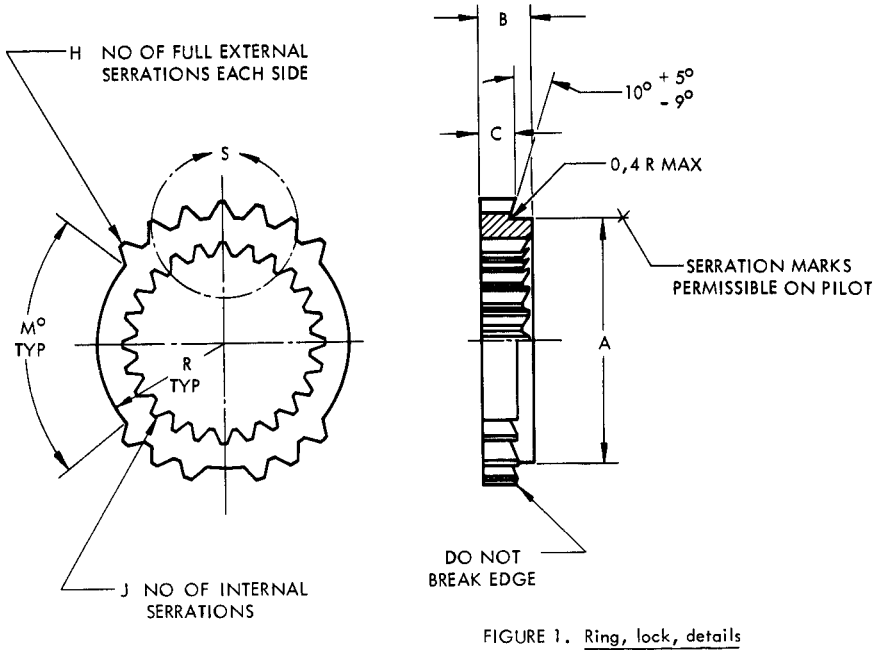
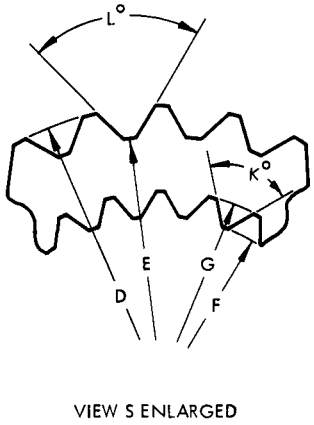


FIGURE 1. Ring, lock, details



VIEW S ENLARGED

NO SPECIFIC ANGULARITY EXISTS BETWEEN INTERNAL AND EXTERNAL SERRATIONS. THE SERRATED SECTORS WILL BE LOCATED DIAMETRICALLY OPPOSITE.

TABLE I. Part dimensions

DASH NUMBERS		A DIA	B	C	D DIA	E DIA	F DIA	G DIA	H	J	K°	L°	M°	R	MASS kg/1000 PCS
CARBON STEEL	A-286 CRES	0 -0,2	0 -0,3	0 -0,3	+0,2 0	MAX	+0,2 0	MIN			+1° -2°	±2°	APPROX	+0,2 0	(NOTE 9) APPROX
1	1C	7,79	2,15	1,15	9,48	8,66	5,32	6,10	4	13	102°	99°	85°	4,13	0,34
2	2C	9,12	2,35	1,25	10,62	9,78	6,62	7,50	4	17	86°	98°	90°	4,69	0,55
3	3C	11,03	3,35	2,05	12,78	11,91	8,60	9,50	6	17	99°	97°	78°	5,75	1,04
4	4C	13,11	4,05	2,55	14,63	13,79	10,66	11,66	6	21	97°	96°	93°	6,70	1,35
5	5C	14,88	4,65	3,25	16,72	15,72	12,30	13,26	6	24	96°	96°	86°	7,66	2,00
6	6C	18,57	4,65	3,25	20,80	19,71	14,50	15,50	8	26	111°	95°	81°	9,66	4,15
7	7C	20,95	4,65	3,25	22,82	21,79	17,25	18,52	8	28	96°	94°	93°	10,70	3,80

5340

NOTES:

1. MATERIAL: Steel, carbon, composition C1117, in accordance with Federal Standard Number 66.
   Steel, corrosion resistant, A-286 per AMS 5734, heat treated and aged.
2. PROTECTIVE COATING: Steel, carbon, 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.
3. SURFACE ROUGHNESS: Machined surfaces to be 3.2 micrometres in accordance with ISO recommendation R 468, except serrations.
4. HARDNESS: Rings of carbon steel shall be case hardened to RC 36-45 in accordance with procurement specification. Rings of corrosion resistant steel shall be hardened to Brinell 269 min in accordance with procurement specification.
5. FILLETS: Fillets shall be 0.4 R maximum.
6. EDGES: Edges broken 0.1 - 0.4 unless otherwise specified.
7. DIMENSIONS: Dimensions in millimetres; to be met after plating.
8. PART NUMBERS: The part number consists of the letter D, plus the basic number of the specification sheet, plus the dash number.

   Example: D63276/2-2 Lockring, Carbon Steel
   D63276/2-2C Lockring, Cres
9. Values for mass have been calculated with a density of 7.95 kg/dm3.
10. Referenced documents shall be of the issue in effect on date of invitations for bid.
11. For design feature purposes, this specification takes precedence over procurement documents referenced herein.

Custodians:
Army - WC
Navy - OS
Air Force - 99

Reviewer Activities:
Army - AT, AV, MI
DSA - IS

Preparing Activity:
Army - WC

Project No. 5340-2011

User Activities:
Army - El, GL
Navy - YD

TOOLING FOR D63275/1 STUDS

STUD DASH NUMBER D63275/1	BASIC ROSÁN PART NUMBER	STEP DRILL [1]	DRIVE WRENCH	LOCKRING DRIVE TOOL	REMOVAL [2] TOOL, CARBIDE (HOLLOW MILL)
-101 -201	SM0508()08	14-22008-012	M8W	SMT508D5	14-11000-005
-102 -202	SM0610()10	14-22010-014	M10W	SMT610D6	14-11000-006
-103 -203	SM0710()12	14-22012-018	M12W	SMT712D7	14-11000-007
-104 -204	SM0812()12	14-22012-018	M12W	SMT812D8	14-11000-008
-105 -205	SM0810()12	14-22012-018	M12W	SMT812D8	14-11000-008
-106 -206	SM1015()14	14-22014-022	M14W	SMT1014D10	14-11000-010
-107 -207	SM1012()14	14-22014-022	M14W	SMT1014D10	14-11000-010
-108 -208	SM1215()16	14-22016-026	M16W	SMT1216D11	14-11000-012
-109 -209	SM1212()16	14-22016-026	M16W	SMT1216D11	14-11000-012
-110 -210	SM1415()20	14-22020-034	M20W	SMT1420D11	14-11000-014

NOTES: UNLESS OTHERWISE SPECIFIED

[1] **Step Drills are designed for thru hole drilling. When used to drill a blind hole, it may be necessary to grind the drill to suit the depth required.**

[2] **See page 27 for removal instructions.**

INTERCHANGEABILITY TABLES
DOD VERSUS ROSÁN

STUDS

DOD PART NUMBER	ROSÁN PART NUMBER
D63275/1A101-(*)	SM0508K08-(*)S2
D63275/1A102-(*)	SM0610K10-(*)S2
D63275/1A103-(*)	SM0710K12-(*)S2
D63275/1A104-(*)	SM0812K12-(*)S2
D63275/1A105-(*)	SM0810K12-(*)S2
D63275/1A106-(*)	SM1015K14-(*)S2
D63275/1A107-(*)	SM1012K14-(*)S2
D63275/1A108-(*)	SM1215K16-(*)S2
D63275/1A109-(*)	SM1212K16-(*)S2
D63275/1A110-(*)	SM1415K20-(*)S2
D63275/1A201-(*)	SM0508L08-(*)S2
D63275/1A202-(*)	SM0610L10-(*)S2
D63275/1A203-(*)	SM0710L12-(*)S2
D63275/1A204-(*)	SM0812L12-(*)S2
D63275/1A205-(*)	SM0810L12-(*)S2
D63275/1A206-(*)	SM1015L14-(*)S2
D63275/1A207-(*)	SM1012L14-(*)S2
D63275/1A208-(*)	SM1215L16-(*)S2
D63275/1A209-(*)	SM1212L16-(*)S2
D63275/1A210-(*)	SM1415L20-(*)S2
D63275/1B101-(*)	SM0508K08-(*)S3
D63275/1B102-(*)	SM0610K10-(*)S3
D63275/1B103-(*)	SM0710K12-(*)S3
D63275/1B104-(*)	SM0812K12-(*)S3
D63275/1B105-(*)	SM0810K12-(*)S3
D63275/1B106-(*)	SM1015K14-(*)S3
D63275/1B107-(*)	SM1012K14-(*)S3
D63275/1B108-(*)	SM1215K16-(*)S3
D63275/1B109-(*)	SM1212K16-(*)S3
D63275/1B110-(*)	SM1415K20-(*)S3

DOD PART NUMBER	ROSÁN PART NUMBER
D63275/1A101-(*)J	SMJ0508K08-(*)S2
D63275/1A102-(*)J	SMJ0610K10-(*)S2
D63275/1A103-(*)J	SMJ0710K12-(*)S2
D63275/1A104-(*)J	SMJ0812K12-(*)S2
D63275/1A105-(*)J	SMJ0810K12-(*)S2
D63275/1A106-(*)J	SMJ1015K14-(*)S2
D63275/1A107-(*)J	SMJ1012K14-(*)S2
D63275/1A108-(*)J	SMJ1215K16-(*)S2
D63275/1A109-(*)J	SMJ1212K16-(*)S2
D63275/1A110-(*)J	SMJ1415K20-(*)S2
D63275/1A201-(*)J	SMJ0508L08-(*)S2
D63275/1A202-(*)J	SMJ0610L10-(*)S2
D63275/1A203-(*)J	SMJ0710L12-(*)S2
D63275/1A204-(*)J	SMJ0812L12-(*)S2
D63275/1A205-(*)J	SMJ0810L12-(*)S2
D63275/1A206-(*)J	SMJ1015L14-(*)S2
D63275/1A207-(*)J	SMJ1012L14-(*)S2
D63275/1A208-(*)J	SMJ1215L12-(*)S2
D63275/1A209-(*)J	SMJ1212L16-(*)S2
D63275/1A210-(*)J	SMJ1415L20-(*)S2
D63275/1B101-(*)J	SMJ0508K08-(*)S3
D63275/1B102-(*)J	SMJ0610K10-(*)S3
D63275/1B103-(*)J	SMJ0710K12-(*)S3
D63275/1B104-(*)J	SMJ0812K12-(*)S3
D63275/1B105-(*)J	SMJ0810K12-(*)S3
D63275/1B106-(*)J	SMJ1015K14-(*)S3
D63275/1B107-(*)J	SMJ1012K14-(*)S3
D63275/1B108-(*)J	SMJ1215K16-(*)S3
D63275/1B109-(*)J	SMJ1212K16-(*)S3
D63275/1B110-(*)J	SMJ1415K20-(*)S3

DOD PART NUMBER	ROSÁN PART NUMBER
D63275/1A101D(*)	SM0508K08S(*)S2
D63275/1A102D(*)	SM0610K10S(*)S2
D63275/1A103D(*)	SM0710K12S(*)S2
D63275/1A104D(*)	SM0812K12S(*)S2
D63275/1A105D(*)	SM0810K12S(*)S2
D63275/1A106D(*)	SM1015K14S(*)S2
D63275/1A107D(*)	SM1012K14S(*)S2
D63275/1A108D(*)	SM1215K16S(*)S2
D63275/1A109D(*)	SM1212K16S(*)S2
D63275/1A110D(*)	SM1415K20S(*)S2
D63275/1A201D(*)	SM0508L08S(*)S2
D63275/1A202D(*)	SM0610L10S(*)S2
D63275/1A203D(*)	SM0710L12S(*)S2
D63275/1A204D(*)	SM0812L12S(*)S2
D63275/1A205D(*)	SM0810L12S(*)S2
D63275/1A206D(*)	SM1015L14S(*)S2
D63275/1A207D(*)	SM1012L14S(*)S2
D63275/1A208D(*)	SM1215L16S(*)S2
D63275/1A209D(*)	SM1212L16S(*)S2
D63275/1A210D(*)	SM1415L20S(*)S2
D63275/1B101D-(*)	SM0508K8S(*)S3
D63275/1B102D-(*)	SM0610K10S(*)S3
D63275/1B103D-(*)	SM0710K12S(*)S3
D63275/1B104D-(*)	SM0812K12S(*)S3
D63275/1B105D-(*)	SM0810K12S(*)S3
D63275/1B106D-(*)	SM1015K14S(*)S3
D63275/1B107D-(*)	SM1012K14S(*)S3
D63275/1B108D-(*)	SM1215K16S(*)S3
D63275/1B109D-(*)	SM1212K16S(*)S3
D63275/1B110D-(*)	SM1415K20S(*)S3

DOD PART NUMBER	ROSÁN PART NUMBER
D63275/1A101D(*)J	SMJ0508K08S(*)S2
D63275/1A102D(*)J	SMJ0610K10S(*)S2
D63275/1A103D(*)J	SMJ0710K12S(*)S2
D63275/1A104D(*)J	SMJ0812K12S(*)S2
D63275/1A105D(*)J	SMJ0810K12S(*)S2
D63275/1A106D(*)J	SMJ1015K14S(*)S2
D63275/1A107D(*)J	SMJ1012K14S(*)S2
D63275/1A108D(*)J	SMJ1215K16S(*)S2
D63275/1A109D(*)J	SMJ1212K16S(*)S2
D63275/1A110D(*)J	SMJ1415K20S(*)S2
D63275/1A201D(*)J	SMJ0508L08S(*)S2
D63275/1A202D(*)J	SMJ0610L10S(*)S2
D63275/1A203D(*)J	SMJ0710L12S(*)S2
D63275/1A204D(*)J	SMJ0812L12S(*)S2
D63275/1A205D(*)J	SMJ0810L12S(*)S2
D63275/1A206D(*)J	SMJ1015L14S(*)S2
D63275/1A207D(*)J	SMJ1012L14S(*)S2
D63275/1A208D(*)J	SMJ1215L16S(*)S2
D63275/1A209D(*)J	SMJ1212L16S(*)S2
D63275/1A210D(*)J	SMJ1415L20S(*)S2
D63275/1B101D(*)J	SMJ0508K08S(*)S3
D63275/1B102D(*)J	SMJ0610K10S(*)S3
D63275/1B103D(*)J	SMJ0710K12S(*)S3
D63275/1B104D(*)J	SMJ0812K12S(*)S3
D63275/1B105D(*)J	SMJ0810K12S(*)S3
D63275/1B106D(*)J	SMJ1015K14S(*)S3
D63275/1B107D(*)J	SMJ1012K14S(*)S3
D63275/1B108D(*)J	SMJ1215K16S(*)S3
D63275/1B109D(*)J	SMJ1212K16S(*)S3
D63275/1B110D(*)J	SMJ1415K20S(*)S3

(*) Add dash number for nut end length. See table III, page 47.

LOCKRINGS

DOD PART NUMBER	ROSÁN PART NUMBER
D63276/2-1	RLRRM8.8SC
D63276/2-2	RLRRM10SC
D63276/2-3	RLRRM12SC
D63276/2-4	RLRRM14SC
D63276/2-5	RLRRM16SC
D63276/2-6	RLRRM20SC
D63276/2-7	RLRRM22SC

DOD PART NUMBER	ROSÁN PART NUMBER
D63276/2-1C	RLRRM8.8SU
D63276/2-2C	RLRRM10SU
D63276/2-3C	RLRRM12SU
D63276/2-4C	RLRRM14SU
D63276/2-5C	RLRRM16SU
D63276/2-6C	RLRRM20SU
D63276/2-7C	RLRRM22SU

METRIC

DOD-S-63275/1
STUD SHEAR ENGAGEMENT AREAS

D63275/1

D63275/1 DASH NUMBER	SHEAR ENGAGEMENT AREA[1] (MM^2)
-101	73.1
-102	93.6
-103	140.4
-104	203.3
-105	203.3
-106	324.6
-107	324.6
-108	504.6
-109	504.6
-110	643.4

D63275/1

D63275/1 DASH NUMBER	SHEAR ENGAGEMENT AREA[1] (MM^2)
-201	127.8
-202	172.2
-203	253.1
-204	356.5
-205	356.5
-206	559.0
-207	559.0
-208	858.4
-209	858.4
-210	1123.8

NOTES: UNLESS OTHER SPECIFIED

[1] The thread minimum shear engagement area is the axial thread shear area of the stud assembly (stud end thd to boss thd) that must resist thread stripping due to tensile loads being applied. It does not represent a dimension of either of the members in an unassembled condition.

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