SAE Aerospace
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AEROSPACE STANDARD

SAE AS1561

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Stud, Locked In - Ring, Straight, Installation and Removal Of

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

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.

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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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 an "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.

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 counterbore 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.

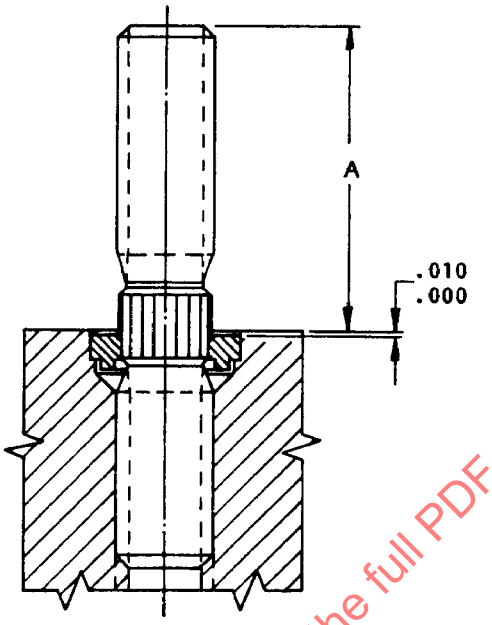

FIGURE 1

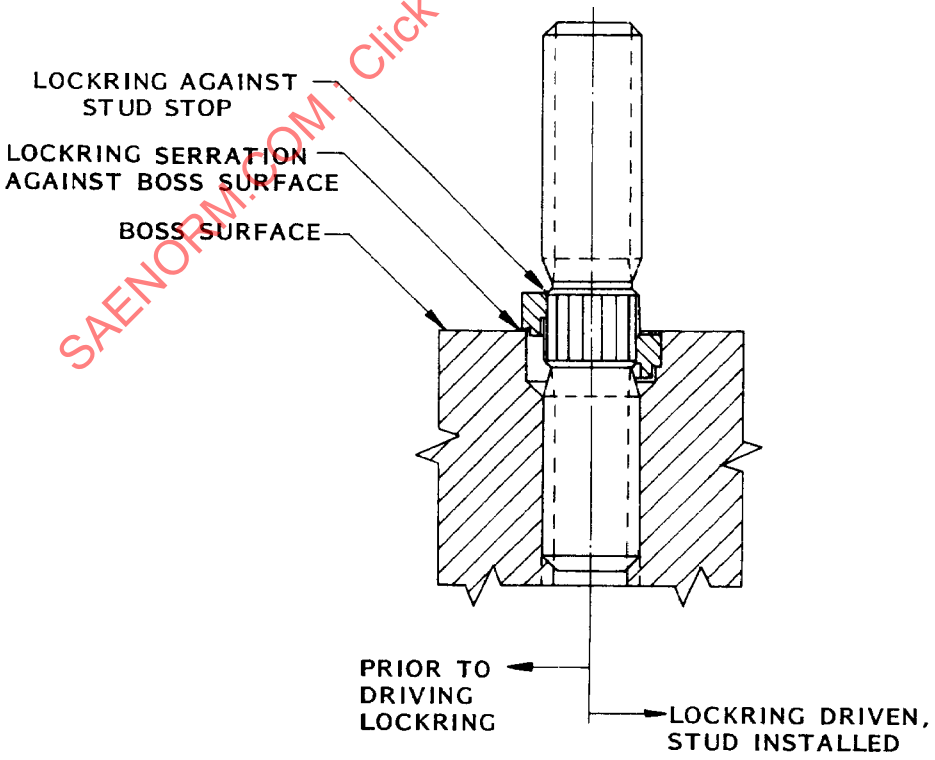

FIGURE 2

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: Rosan, 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.

4.2.2 Studs 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).