

# PROCESS SPECIFICATION P1013

**Installation Procedure for A.F.O.<sup>®</sup> Plugs  
(Standard Sizes)**





# PROCESS SPECIFICATION P1013

Revision H

## Installation Procedure for A.F.O.<sup>®</sup> Plugs (Standard Sizes)



**Unlimited Distribution**

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### REVISION STATUS

Sheet	Rev.	Date	Written By:	Approved By:	Description
1 - 6	A	01/09/97	A. Miller	B. Brelig	Initial release.
1 - 6	B	06/22/07	H. Mitchell	B. Brelig	Updated 2.1 chart and Table 1.
1 - 6	C	09/24/08	D. Peters	B. Brelig	Updated Table 1.
1 - 8	D	03/21/18	M. Perillo	R. Merrick	Added Table 2, updated Table 1 and Section 3.3.
1 - 8	E	09/11/18	D. Reilly	R. Merrick	Added Figure 2, updated Sections 3.3 and 4.0.
1 - 6	F	04/30/20	D. Reilly	R. Merrick	Added Section 4.1.1. Updated Table 1 & Section 2.1. Reformatted figures & tables. Updated document to QCBD format.
1 - 6	G	9/14/20	D. Reilly	R. Merrick	Updated Tables 1-3, Added Tables 4 & 5.
1 - 6	H	11/10/20	D. Reilly	R. Merrick	Updated Table 1, Table 5, & Section 4.1.

## 1.0 SCOPE

This specification describes the proper seat coining and installation procedure for A.F.O. Plugs.

## 2.0 APPLICABLE DOCUMENTS

### 2.1 Lee Company Drawings

The standard A.F.O. Plugs have associated Lee Company drawing designations as follows:

**Table 1: Standard A.F.O. Plugs**

A.F.O. Plug Thread Size	Part #/Drawing PLAA	Seat Coining Tool CUTA
.190 – 32	PLAA1932010A PLAA1932020A	CUTA1900163A
.250 – 28	PLAA2528010A PLAA2528020A	CUTA2500163A
.250 – 28 (Dual Sealing)	PLAA2528110A PLAA2528111A PLAA2528120A PLAA2528121A	CUTA2500263A
.312 – 24	PLAA3124010A PLAA3124020A	CUTA3120163A
.312 – 24 (Dual Sealing with Backup Rings)	PLAA3124220A	CUTA3120363A
.375 – 24	PLAA3724010A PLAA3724020A	CUTA3750163A
.375 – 24 (Dual Sealing with Backup Rings)	PLAA3724220A	CUTA3750363A
.500 – 20	PLAA5020010A PLAA5020020A	CUTA5000163A
.500 – 20 (Dual Sealing)	PLAA5020110A PLAA5020120A	CUTA5000263A
.500 – 20 (Dual Sealing with Backup Rings)	PLAA5020220A	CUTA5000363A
.625 – 18	PLAA6218010A PLAA6218020A	CUTA6250163A
.750 – 16	PLAA7516010A PLAA7516020A	CUTA7500163A
.750 – 16 (Dual Sealing)	PLAA7516110A PLAA7516120A	CUTA7500263A

## **3.0 MACHINING & COINING BOSS**

### **3.1 Machining**

Machine the threaded installation hole to the dimensions shown on the installation drawings. Care should be taken to ensure that the seating area is not nicked or scratched. The use of a depth stop on the tap is advised.

### **3.2 Hole Preparation and Inspection**

Clean and deburr the hole as necessary. The seating area at the intersection of the thru hole and the threaded hole must be free of burrs, nicks, and scratches to provide a smooth surface for coining.

### **3.3 Sealing Seat Coining**

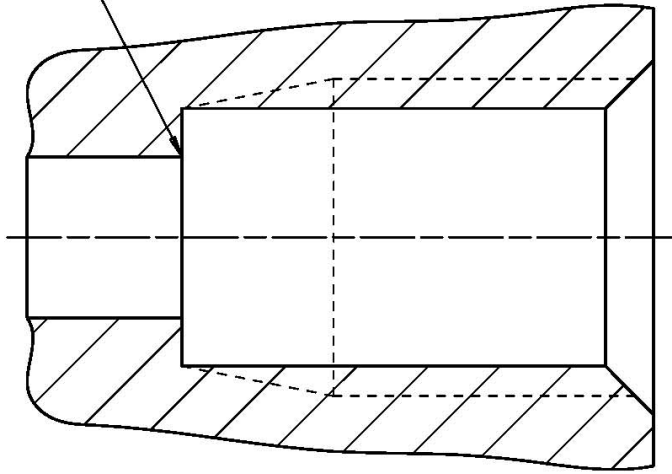
Coin the sealing seat using the tool called out in Section 2.1 based on the A.F.O. Plug thread size. Figure 1 depicts a cross section of an installation hole before and after the coining operation.

Coining the seat is accomplished by rotating the coining tool to an appropriate angle. The angle has been calculated to correspond to an even chamfer within the acceptable width. The proper angles of rotation for Lee coining tools are listed in Table 2.

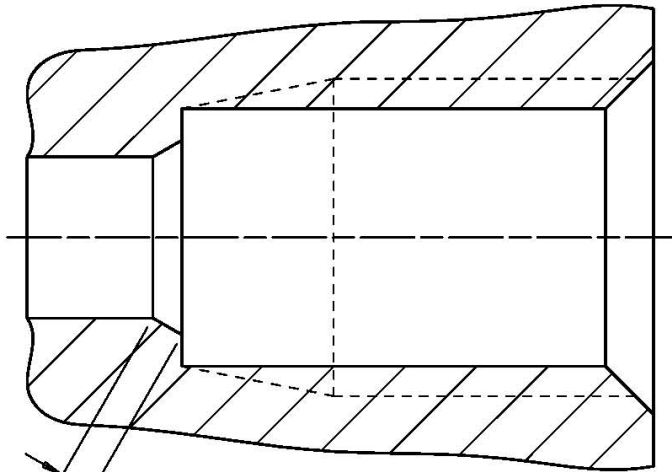
Coining tools are marked with two lines on the top face to aid in the measurement of the rotation, as shown in Figure 2. The longer line represents the reference point (0°) and the shorter line indicates the finish point.

Thread the tool by hand into the installation hole until the nose bottoms out on the edge to be coined. Mark a line at the finish point on the housing manifold and use a wrench to rotate the tool until the reference line is parallel with the manifold marking. In tougher materials that are difficult to coin, the nose and threads may be coated with a high film strength oil to prevent galling during the coining operation. The Lee Company recommends using Mobilgrease 28.

SEALING EDGE, NO BURRS, NICKS  
OR SCRATCHES PERMITTED.



INSTALLATION HOLE BEFORE COINING



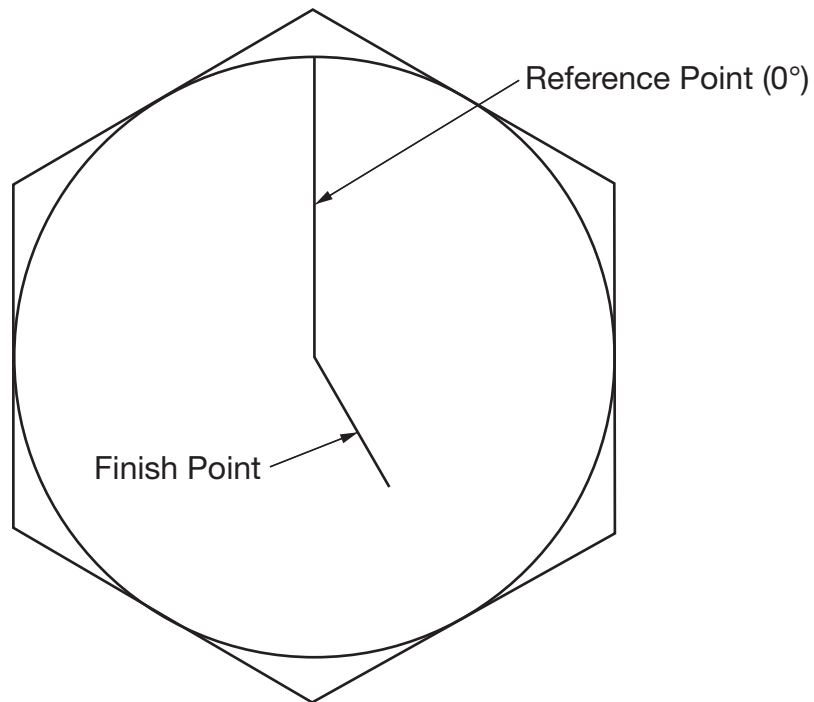
.025 SEAT  
.015 FORMED

INSTALLATION HOLE AFTER COINING

FIGURE 1  
SKPP1013.1  
06-22-07

**Table 2: Tool Rotation**

COINING TOOL	THREAD SIZE	REQUIRED TOOL ROTATION
CUTA1900163A	0.190-32	200° ± 45°
CUTA2500163A	0.250-28	175° ± 35°
CUTA2500263A		
CUTA3120163A	0.312-24	150° ± 30°
CUTA3120363A		
CUTA3750163A	0.375-24	150° ± 30°
CUTA3750363A		
CUTA5000163A	0.500-20	125° ± 25°
CUTA5000263A		
CUTA5000363A		
CUTA6250163A	0.625-18	110° ± 25°
CUTA7500163A	0.750-16	100° ± 20°
CUTA7500263A		



**FIGURE 2**  
Rotational Markings



### 3.3.1 Alternative Sealing Seat Coining Method

An alternative method for coining a sealing seat is to determine the torque required to reach an appropriate seat width. The required torque varies based on the material properties of the installation hole and coining tool and must be validated for each material combination. **This is not the recommended method.**

Reference coining torques for select materials are listed in Table 3.

**Table 3: Reference Coining Torques**

STANDARD COINING TORQUES							
BOSS MATERIAL	COINING TOOL THREAD DIAMETER						
	0.190	0.250	0.312	0.375	0.500	0.625	0.750
2024-T4 AL	10 in·lbs	30 in·lbs	85 in·lbs	125 in·lbs	25 ft·lbs	40 ft·lbs	50 ft·lbs
416 SS (Rc 29)	22 in·lbs	71 in·lbs	180 in·lbs	275 in·lbs	40 ft·lb	95 ft·lb	95 ft·lb
AISI 8630	22 in·lbs	71 in·lbs	180 in·lbs	275 in·lbs	35 ft·lb	95 ft·lb	95 ft·lb

### 3.4 Seat Inspection

Remove the tool and inspect the seat. An even chamfer of .015 - .025 inches wide is acceptable (see Figure 1).

If the chamfer is not wide enough, repeat the coining procedure at a slightly higher angle of rotation (or torque value) and re-inspect the seat.

## 4.0 INSTALLATION PROCEDURE

### 4.1 A.F.O. Plug Installation

After the installation hole is manufactured to the proper dimensions and the seat is coined, install the A.F.O. Plug by hand until the nose piece is seated against the sealing surface. Tighten the A.F.O. Plug to its installation torque as described in Table 4. Special A.F.O. Plugs, part numbers starting with "PLAX", should use the installation torque listed in Table 4, unless otherwise specified on the drawing. The A.F.O. plug may be coated with a high film strength oil on the nose piece and the area between the body and nose. The Lee Company recommends using Mobilgrease 28.

**Table 4: A.F.O. Installation Torques**

A.F.O. INSTALLATION TORQUES							
BOSS MATERIAL	A.F.O. THREAD DIAMETER						
	0.190	0.250	0.312	0.375	0.500	0.625	0.750
2024-T4 AL	7 in·lbs	25 in·lbs	75 in·lbs	100 in·lbs	25 ft·lbs	40 ft·lbs	50 ft·lbs
416 SS (Rc 29)	18 in·lbs	55 in·lbs	90 in·lbs	220 in·lbs	30 ft·lbs	55 ft·lbs	75 ft·lbs
AISI 8630	18 in·lbs	55 in·lbs	90 in·lbs	220 in·lbs	30 ft·lbs	55 ft·lbs	75 ft·lbs

**Note:** Installation torque should not exceed the coining torque.

#### 4.1.1 Dual Sealing A.F.O. Plug Installation

The O-ring for a Dual Sealing A.F.O. Plug should be lightly coated with lubrication to give it added protection during installation. The Lee Company recommends using Super Lube O-ring Silicone Grease.

Torque values in Table 5 are intended for installing a Dual Sealing A.F.O. against no pressure. For systems where the O-ring is sealing pressure before the plug is seated at the nose seal, additional torque is required to properly install the part. The additional torque needed will be equal to the force necessary to overcome the pressure being sealed by the O-ring.

**Table 5: Dual Sealing A.F.O. Installation Torques**

<b>DUAL SEALING A.F.O. INSTALLATION TORQUES</b>				
<b>PART NUMBER</b>	<b>BOSS MATERIAL</b>			
	<b>2024-T4 AL</b>	<b>416 SS (Rc 29)</b>	<b>AISI 8630</b>	<b>INCONEL 718</b>
<b>PLAA2528110A PLAA2528111A</b>	21 in·lbs	19 in·lbs	19 in·lbs	N/A
<b>PLAA2528120A PLAA2528121A</b>	25 in·lbs	25 in·lbs	28 in·lbs	N/A
<b>PLAA3124220A</b>	75 in·lbs	90 in·lbs	90 in·lbs	90 in·lbs
<b>PLAA3724220A</b>	100 in·lbs	220 in·lbs	220 in·lbs	220 in·lbs
<b>PLAA5020110A</b>	25 ft·lbs	30 ft·lbs	30 ft·lbs	N/A
<b>PLAA5020120A</b>	25 ft·lbs	30 ft·lbs	30 ft·lbs	N/A
<b>PLAA5020220A</b>	25 ft·lbs	30 ft·lbs	30 ft·lbs	30 ft·lbs
<b>PLAA7516110A</b>	50 ft·lbs	75 ft·lbs	75 ft·lbs	N/A
<b>PLAA7516120A</b>	50 ft·lbs	75 ft·lbs	75 ft·lbs	N/A

**Note:** Installation torque should not exceed the coining torque.



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