



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND REMOVAL OF PLUG

Rev: N/C

Page 1 of 11

1. SCOPE:

1.1. This provides the minimum design, port preparation, and installation and removal requirements for SLAS5103 plugs and is applicable when specified on engineering drawings. These instructions are not intended to supersede or supplement any specific instructions that are provided by the Design Activity or Responsible Customer unless indicated as such.

2. GENERAL DESIGN INFORMATION

2.1. These plugs provide a semi-permanent plug for use in 4000 and 5000 psi fluid systems per table 1:

TABLE 1 - PRESSURE SYSTEMS

SYSTEM WORKING PRESSURE				
Shur-Lok Part Number Series	Product Description	Operating psi	Burst psi	Sizes
SLAS5103	Plug	4000	16000	All
SLAS5103	Plug	5000	20000	04, 06, 08, 10, 12 and 16

2.2. Plugs per SLAS5103 installed per this document into ports per SLAS1300 shall have a stand-off per dimension “P” in figure 1 and table 2.

2.3. O-ring size per table 2 and per AS568 must be used. The O-ring compound shall be specified by the using design activity and shall be selected based on system fluid and temperature.

2.4. The lockring is driven into the mating port serrations after the plug has been torqued. This eliminates the necessity of lock wiring the plug.

2.5. Plug removal is accomplished by lifting the lockring out of the port using a removal tool.



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND REMOVAL OF PLUG

Rev: N/C

Page 2 of 11

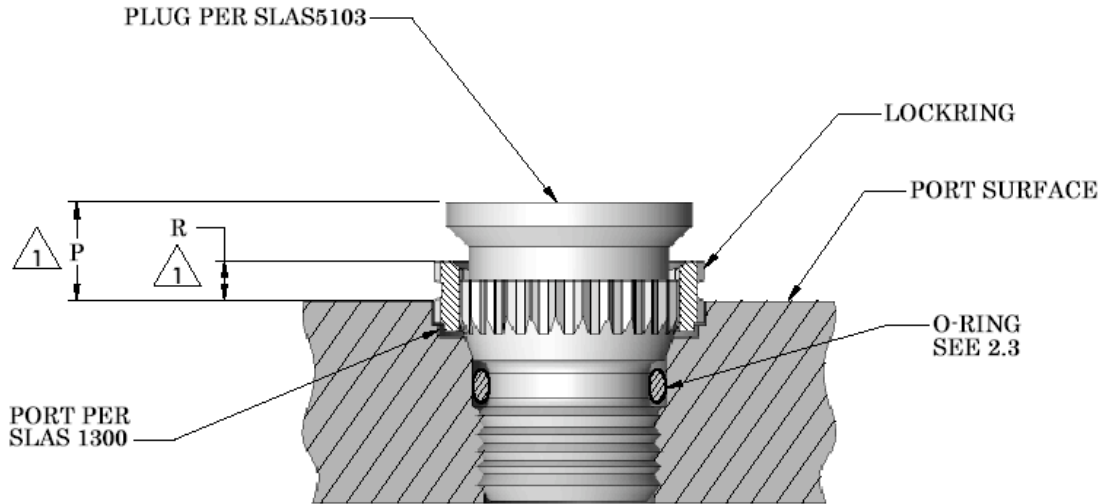


FIGURE - 1 INSTALLED PLUG

\triangle “P” and “R” dimensions are for design purposes only and represent final stand-off dimensions. Do not use as installation dimensions.

TABLE 2 – INSTALLATION DIMENSIONS AND TORQUE VALUES

Port Number	O-ring size See 2.3	\triangle P \pm 0.20	\triangle R \pm Max	Installation Torque lbf-in
02	AS568-007	0.253	0.124	16 - 21
03	AS568-008	0.253	0.124	38 - 45
04	AS568-010	0.253	0.124	60 -100
05	AS568-011	0.261	0.124	100 - 120
06	AS568-012	0.279	0.130	180 - 245
08	AS568-014	0.279	0.130	430 - 510
10	AS568-016	0.279	0.130	600 - 680
12	AS568-116	0.279	0.140	855- 945
14	AS568-118	0.289	0.140	995- 1105
16	AS568-120	0.289	0.140	1140- 1260
20	AS568-123	0.269	0.140	1520- 1680
24	AS568-128	0.290	0.140	1900- 2100
32	AS568-137	0.389	0.140	2660- 2940



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND
REMOVAL OF PLUG

Rev: N/C

Page 3 of 11

3. DESIGN REQUIREMENTS:

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

3.1.1. Port diameter to be at least the minimum specified in SLAS1300.

3.1.2. Location of port.

3.1.3. Specify port size per SLAS1300. If tap drill depth is not through, then specify control dimensions.

3.1.4. Specify plug size per SLAS5103.

3.1.5. Specify O-ring size and compound (see section 2.3)

3.1.6. Install plug per this document.

3.1.7. Corrosion protection is specified in 5.2.4. If materials or fluids require primer different from zinc chromate primer or if an additional sealant is required, so specify.

3.1.8. Pressure testing of individual unit is specified in section 6.0. Testing other than that shown shall be specified.

3.1.9. The boss material for a 4000 and 5000 psi system must have a minimum shear strength per table 6 to resist the axial load being generated from a respective burst pressure of 16,000 psi and 20,000 psi (based on thread minimum shear engagement area shown).

4. PORT PREPARATION

4.1. Prepare boss and port per SLAS1300. Drill thru or to depth specified on applicable drawing. Use a drill with a diameter .015 - .030 smaller than that specified as the minor diameter on SLAS1300 standard. This will allow the McKinnon MPT porting tool to finish the minor diameter of the port thread to the sizes required for piloting of the broach tool (refer to port preparation tools in table 3).

4.2. Chip removal is required after broaching and prior to plug installation.



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

**TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND
 REMOVAL OF PLUG**

Rev: N/C

Page 4 of 11

TABLE 3 – PORT PREPARATION TOOLING

Port Number	Porting Tool	Broaching Tool (Select one)				Chip Removal
		Hand Held	Non-Impact	EDM	Wobble	
		[1] (Boss hardness up to 32 HRC)	[2] [3] [4] (Boss hardness up to 40 HRC)	[5] (Boss hardness above 40 HRC)	[6] (Boss hardness up to 40 HRC)	
02	MPT02*	MFOPB5002	MFOPB5002HDB	MFOPB5002ED3	MFOPB5002WBA	MF02CR
03	MPT03*	MFOPB5003	MFOPB5003HDB	MFOPB5003ED3	MFOPB5003WBA	MF03CR
04	MPT04*	MFOPB5004	MFOPB5004HDB	MFOPB5004ED3	MFOPB5004WBA	MF04CR
05	MPT05	MFOPB5005	MFOPB5005HDB	MFOPB5005ED3	MFOPB5005WBA	MF05CR
06	MPT06	MFOPB5006	MFOPB5006HDB	MFOPB5006ED3	MFOPB5006WBA	MF06CR
08	MPT08	MFOPB5008	MFOPB5008HDB	MFOPB5008ED3	MFOPB5008WBA	MF08CR
10	MPT10	MFOPB5010	MFOPB5010HDB	MFOPB5010ED3	MFOPB5010WBA	MF10CR
12	MPT12	MFOPB5012	MFOPB5012HDB	MFOPB5012ED3	MFOPB5012WBA	MF12CR
14	MPT14	MFOPB5014	MFOPB5014HDB	MFOPB5014ED3	MFOPB5014WBA	MF14CR
16	MPT16	MFOPB5016	MFOPB5016HDB	MFOPB5016ED3	MFOPB5016WBA	MF16CR
20	MPT20	MFOPB5020	MFOPB5020HDB	MFOPB5020ED3	MFOPB5020WBA	MF20CR
24	MPT24	MFOPB5024	MFOPB5024HDB	MFOPB5024ED3	MFOPB5024WBA	MF24CR
32	MPT32	MFOPB5032	MFOPB5032HDB	MFOPB5032ED3	MFOPB5032WBA	MF32CR

* Solid Carbide Porting Tool all others have Carbide Tip

[1] Replacement cutters may be purchased individually MFOPB50()-3

[2] 2 extra cutters are provided with each tool

[3] Replacement cutters may be purchased individually MFOPB50()HDB5

[4] Replacement studs may be purchased individually MFOPB50()HDB4

[5] MFOPB50XXED3 material Copper Tungsten. MFOPB50()ED2 material is Poco Graphite

[6] Cutter and screw combination can be ordered separately for spares or replacements MFOPB50()WBA23

[7] Cutter is replaceable and can be ordered separately for spares. One spare cutter is supplied with each tool assembly MF()CRP-1

[8] MF()CR can be replaced with MF()CRP for CNC Machine vs manual operation

Tooling is available from McKinnon Industries, a Shur-Lok Company. Tel (949) 655-9231

Rosán is a registered trademark of Alcoa Fastening Systems, part of the Alcoa Corporation.



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

**TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND
 REMOVAL OF PLUG**

Rev: N/C

Page 5 of 11

TABLE 4 – INSTALLATION & REMOVAL TOOLING

Port Number	Porting Tool	Broaching Tool (Select one)				Chip Removal
		Hand Held	Non-Impact	EDM	Wobble	
		[1] (Boss hardness up to 32 HRC)	[2] [3] [4] (Boss hardness up to 40 HRC)	[5] (Boss hardness above 40 HRC)	[6] [7] (Boss hardness up to 40 HRC)	
02	MPT02*	MFOPB5002	MFOPB5002HDB	MFOPB5002ED3	MFOPB5002WBA	MF02CR
03	MPT03*	MFOPB5003	MFOPB5003HDB	MFOPB5003ED3	MFOPB5003WBA	MF03CR
04	MPT04*	MFOPB5004	MFOPB5004HDB	MFOPB5004ED3	MFOPB5004WBA	MF04CR
05	MPT05	MFOPB5005	MFOPB5005HDB	MFOPB5005ED3	MFOPB5005WBA	MF05CR
06	MPT06	MFOPB5006	MFOPB5006HDB	MFOPB5006ED3	MFOPB5006WBA	MF06CR
08	MPT08	MFOPB5008	MFOPB5008HDB	MFOPB5008ED3	MFOPB5008WBA	MF08CR
10	MPT10	MFOPB5010	MFOPB5010HDB	MFOPB5010ED3	MFOPB5010WBA	MF10CR
12	MPT12	MFOPB5012	MFOPB5012HDB	MFOPB5012ED3	MFOPB5012WBA	MF12CR
14	MPT14	MFOPB5014	MFOPB5014HDB	MFOPB5014ED3	MFOPB5014WBA	MF14CR
16	MPT16	MFOPB5016	MFOPB5016HDB	MFOPB5016ED3	MFOPB5016WBA	MF16CR
20	MPT20	MFOPB5020	MFOPB5020HDB	MFOPB5020ED3	MFOPB5020WBA	MF20CR
24	MPT24	MFOPB5024	MFOPB5024HDB	MFOPB5024ED3	MFOPB5024WBA	MF24CR
32	MPT32	MFOPB5032	MFOPB5032HDB	MFOPB5032ED3	MFOPB5032WBA	MF32CR

* Solid Carbide Porting Tool all others have Carbide Tip

[1] Replacement cutters may be purchased individually MFOPB50()-3

[2] 2 extra cutters are provided with each tool

[3] Replacement cutters may be purchased individually MFOPB50()HDB5

[4] Replacement studs may be purchased individually MFOPB50()HDB4

[5] MFOPB50XXED3 material Copper Tungsten. MFOPB50()ED2 material is Poco Graphite

[6] Wobble Broach holder is supplied by Index Corp 10672 Calle Lee Unit 126, Los Alamitos, CA 90720 714-995-1215

[7] Cutter and screw combination can be ordered separately for spares or replacements MFOPB50()WBA23

[8] Cutter is replaceable and can be ordered separately for spares. One spare cutter is supplied with each tool assembly MF()CRP-1

[9] MF()CR can be replaced with MF()CRP for CNC Machine vs manual operation

Tooling is available from McKinnon Industries, a Shur-Lok Company. Tel (949) 655-9231



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND REMOVAL OF PLUG

Rev: N/C

Page 6 of 11

TABLE 5 – AXIAL LOAD AND BOSS Fsu MINIMUM

Port Number	K [1] Total Thread Minimum Shear Engagement Area, in ²	Port "D" Maximum Per SLAS1300 Ref, in	M [2] Axial Load on Plug		N [3] Boss Material Min Fsu (psi) Required to Resist Axial Load	
			Developed by 16,000 psi Burst Pressure lbf	Developed by 20,000 psi Burst Pressure lbf	4000 psi system	5000 psi system
			4000 psi system	5000 psi system		
02	0.0417	0.256	824	--	19760	--
03	0.0802	0.288	1024	--	13005	--
04	0.0989	0.341	1461	1827	14773	18473
05	0.1406	0.403	2041	--	14517	--
06	0.1734	0.466	2729	3411	15739	19671
08	0.2610	0.584	4286	5357	16422	20525
10	0.3807	0.727	6642	8302	17447	21807
12	0.4550	0.901	10201	12752	22420	28026
14	0.6132	1.032	13384	--	21827	--
16	0.7312	1.164	17026	21283	23285	29107
20	0.8559	1.389	24245	--	28327	--
24	1.2328	1.666	34879	--	28293	--
32	2.1634	2.204	61043	--	28216	--

[1] Minimum shear engagement area shown is the assembled dimensional value for the overall engaged area of mating port threads (port threads full depth of plug). It does not represent a dimension of either of the members in an unassembled condition.

[2] Axial Load = Area X Burst Pressure = $\frac{\pi D^2}{4} \times \text{Burst Pressure}$

[3] Fsu Min = Axial Load ÷ Area = M ÷ K

5. INSTALLATION OF PLUG ASSEMBLY SLAS5103 INTO PORT SLAS1300:

5.1. O-ring installation

5.1.1. Place the O-ring (per table 2) over the port thread of the plug. Submerge the fitting, O-ring tool and O-ring in the fluid to be used in the working system, or a lubricant compatible with the system fluid and all components. Slide the O-ring over the O-ring tool and onto the plug. Be sure that the O-ring is not twisted and is properly seated in the groove of the plug. See figure 2.

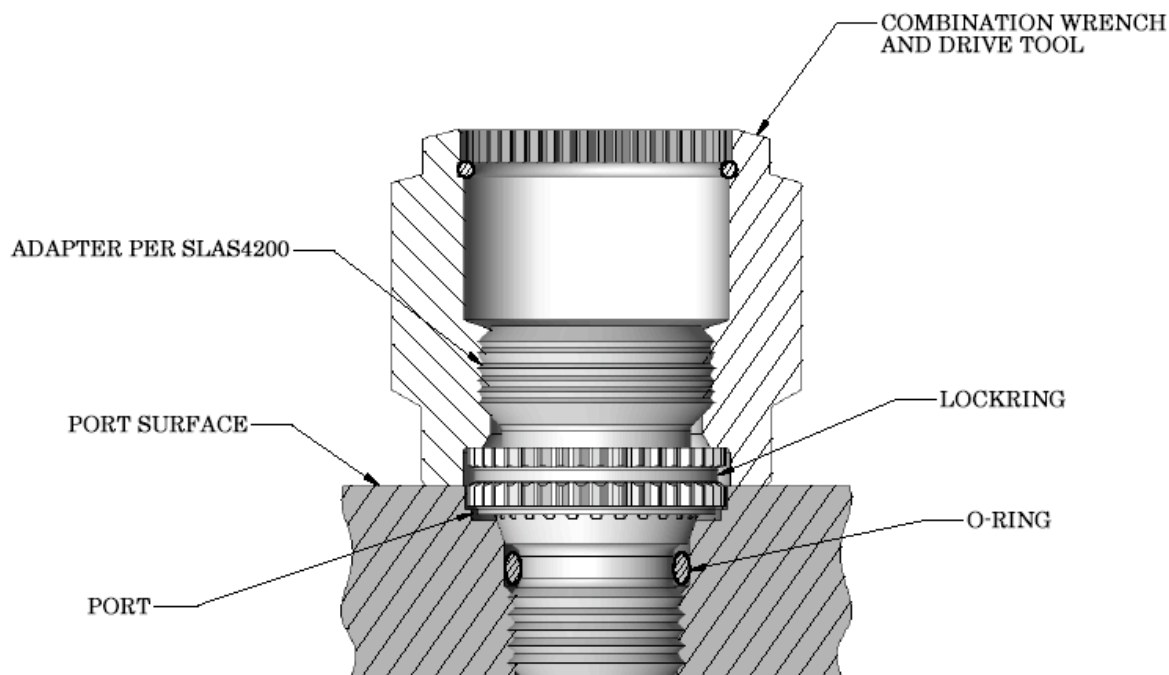


FIGURE - 4 LOCKRING INSTALLATION

5.1.2. Remove the O-ring tool.

5.2. Install plug assembly into port:

- 5.2.1. Lubricate the internal surfaces of the port and the entire plug assembly using the same fluid or lubricant as specified in 5.1.1. Scratches, dings or rough spots are not allowed in O-ring contact area on the plug or in the port.
- 5.2.2. Insert the smaller thread of the plug into port by hand using a clockwise rotation until the plug is seated. To avoid O-ring damage, the plug should not be rotated in a counterclockwise direction.
- 5.2.3. Using the applicable wrench tool in table 4, engage the serrations of the tool with the external serrations of the plug lockring per figure 3. Place a torque wrench of the proper size over the hex of the wrench and apply a torque equal to the minimum value specified in table 2. Note the relationship of the lockring serrations with respect to the prebroached serrations in the port. If they match, proceed to 5.2.4. If the lockring serrations do not match the prebroached



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND
REMOVAL OF PLUG

Rev: N/C

Page 8 of 11

serrations in the port, continue to slowly torque the plug toward the maximum value allowed in table 2 until the serrations match. This will normally take between 3° and 8° of turning, the maximum value need to be reached if the serrations align themselves prior to that value. Do not exceed maximum torque values.

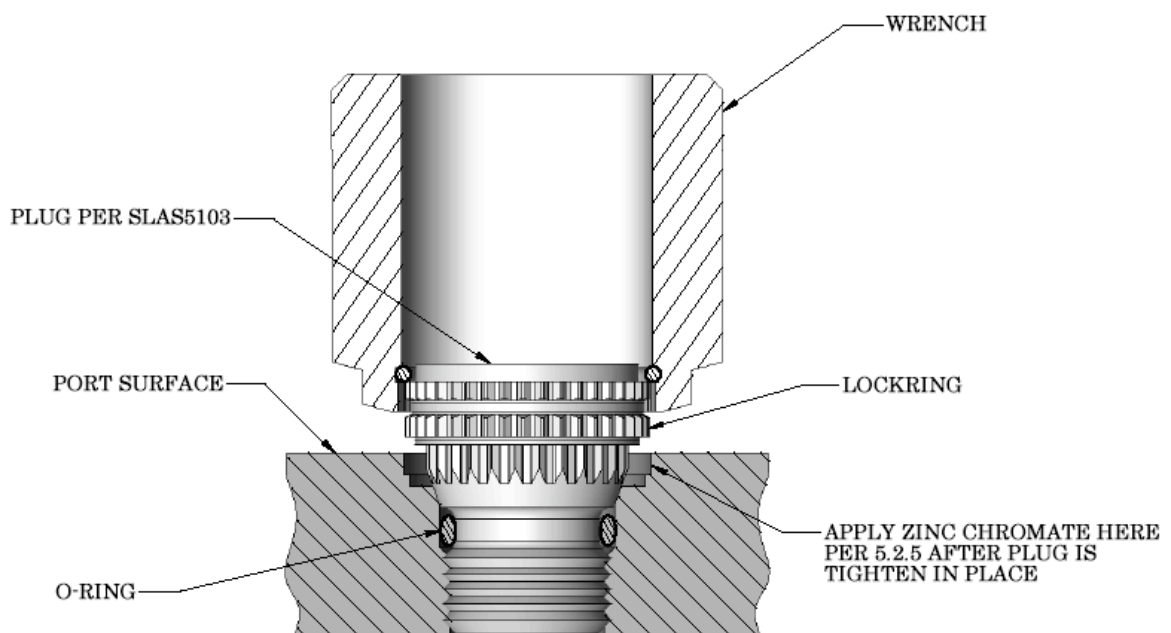


FIGURE - 3 TORQUE PLUG ASSEMBLY

- 5.2.4. Apply enough zinc chromate primer (TT-P-1757) with a brush or small syringe to the counterbore area of the port and below the plug lockring so primer will be extruded out between external serrations of the lockring and serrations in the port when lockring is installed.

Note: Using design activity may specify another primer in place of, or in addition to, zinc chromate (see 3.1.7).

- 5.2.5. While the zinc chromate (or other primer) applied per 5.2.4 is still wet, place the applicable size drive tool over the upper end of the plug per figure 4. When it is properly located it will rest on the lockring. A hammer, arbor, or hydraulic press may be used to press the lockring into the boss. Installation is complete when the tool bottoms on the surface of the boss.



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND REMOVAL OF PLUG

Rev: N/C

Page 9 of 11

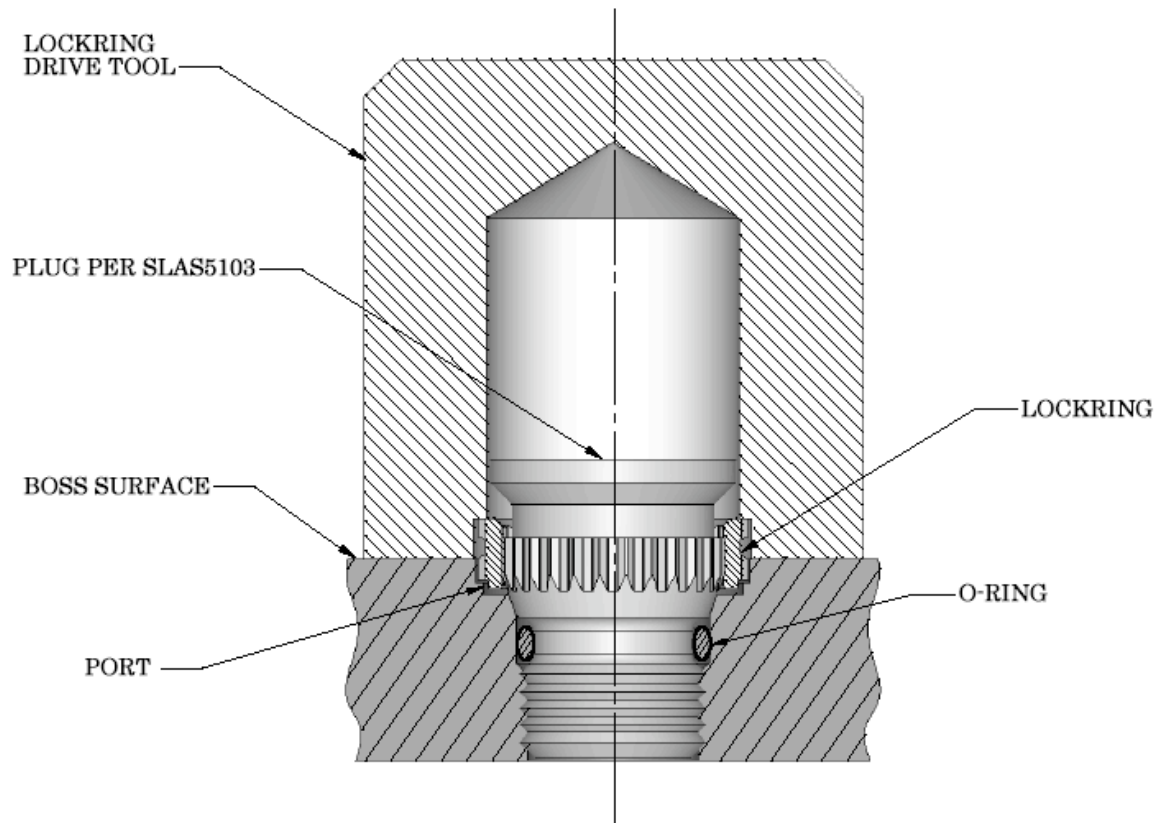


FIGURE - 4 LOCKRING INSTALLATION

Caution: When using a press, any sudden increase in pressure prior to bottoming may indicate that the locking serrations and the port serrations are not aligned. If this occurs, remove the drive tool. Lift the locking per 7.1. Tighten plug clockwise per 5.2.3 until serrations in port and the external serrations on the locking are aligned. Reinstall locking and remove excess primer from surface of port and locking.

6. PRESSURE TESTING:

- 6.1. A pressure test of unit may be conducted at this point. Pressurize the unit to 1.5 times the operating pressure for 3 minutes. There shall be zero leakage. Note that the using design activity may require testing other than that shown.

7. REMOVAL OF PLUG

- 7.1. If an additional sealant has been used to cover the locking, carefully remove sealant to expose locking.



7.2. Lockring Retraction:

7.2.1. Select the proper size removal tool from table 4.

7.2.2. Spread the puller halves apart by retracting the sleeve from the tool until the pin bottoms in the groove of the sleeve per figure 5. Holding the puller halves apart, place tool over protruding plug so that the nylon pad rests on the top surface of the plug. Release the puller halves and locate in the groove of the lockring. Adjustment up or down is achieved by rotating the bolt head. Slide the sleeve over the puller halves and check for proper engagement of the puller halves in the lockring groove.

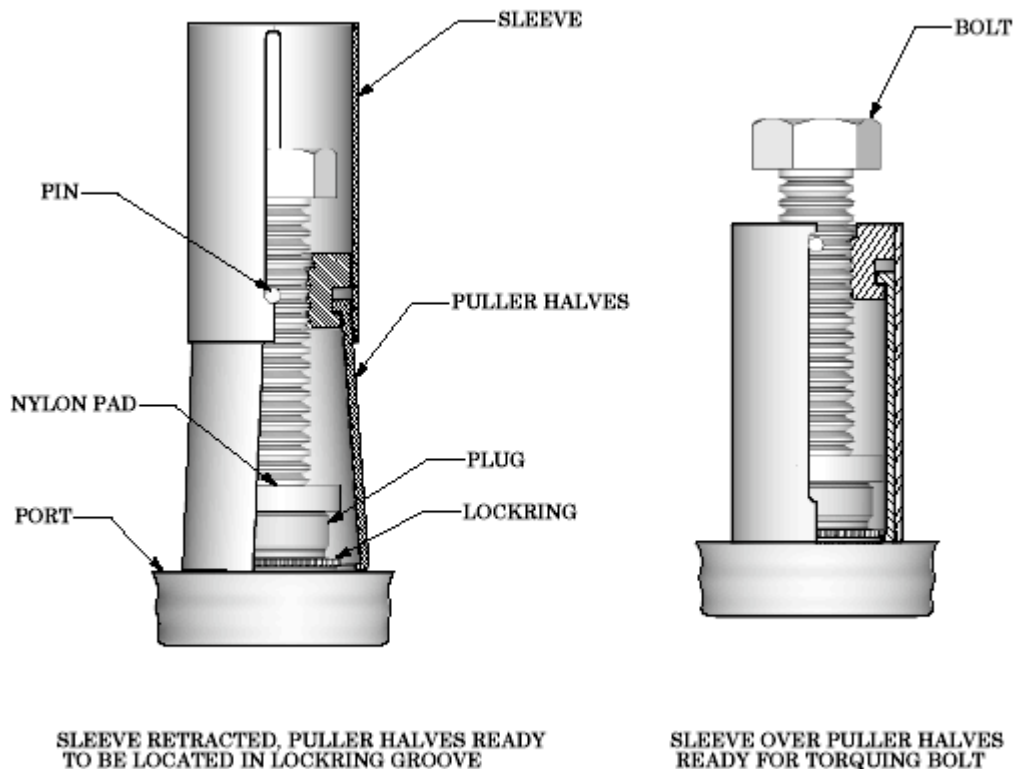


FIGURE 5 - LOCKRING RETRACTION

7.2.3. Place wrench on the bolt head of the removal tool and turn in a clockwise direction while holding the sleeve with the other hand. This action will cause the lockring to be jacked out of the port counterbore. When the external serrations of the lockring are clear of the boss



SHUR-LOK CORPORATION
TECHNICAL SALES BULLETIN

TSB 0025

TITLE: SLAS5104 – PORT PREPARATION, INSTALLATION AND
REMOVAL OF PLUG

Rev: N/C

Page 11 of 11

surface, the turning may be stopped. Remove the tool from the plug by loosening the bolt and lifting the sleeve to free the puller halves.

7.3. Remove the plug from Port:

- 7.3.1. Select the proper size wrench table 4. Engage the serrations of the wrench with those of the lockring. Using an open end or socket wrench over hex on wrench, turn in a counterclockwise direction to disengage the plug from the port. Plug the port minor diameter when cleaning out the cavity to avoid contamination of the fluid system.

8. REINSTALLATION OF PLUG:

- 8.1. Reinstall the plug per section 5 using a new O-ring per table 2 section 2.3