

3.5 Inch Setting Tool Technical Manual

MAN-SET-3500-000 (R02)

OWEN OIL TOOLS

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TECHNICAL INFORMATION:



A single stage setting tool that is light weight, short in length and with a simple design making it easy to redress providing fast turnaround times ideal for stage Frac operations.

An oil damping system built into the top cylinder allows for self-bleeding based on temperature increases. At ignition of the power charge, gas is generated and flows through the piston creating pressure that strokes the tool. During that time oil is forced through the damping system and out of the tool at a controlled rate providing damping that prevents tool damage.

Once the required setting force has been reached and the tool has been released, this allows the bleed port to open and releases the gas pressure into the wellbore before retrieval.

ADVANTAGES:

- Pressure balanced top and bottom pistons which eliminates presetting of plugs, caused by high hydrostatic pressure.
- Short compact design
- Tool does not require manual bleed off at surface.
- Ideal for vertical and horizontal applications.

SPECIFICATIONS:

O.D. (in)[mm]	3.50 [89]
Assembly Part Number	SET-3500-000
Max. Temperature (°F)[°C]	400 [204]
Max. Pressure (psi)[MPa]	15,000 [103]
Length (ft)[m]	4 [1.21]
Empty Weight (lbm)[kg]	90 [40.8]
Stroke (in)[cm]	9.6 [24.38]
Max Setting Force (lbf)[kN]	55,000 [245]
Fishing Strength (lbf)[kN]	136,000 [605]
Upper Head Connection	3-1/8 inch Go

POWER CHARGE

POWER CHARGE	IGNITER
JEC-5321-030	DET-5306-074
CPC-3500-000	DET-5306-075

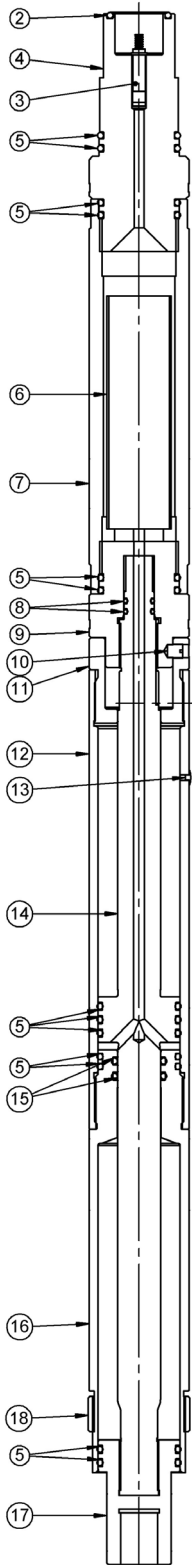
REDRESS KITS

REDRESS KIT	TEMPERATURE RATING (°F)[°C]
SET-3500-040	32 °F - 400 °F [0 °C - 204 °C]
SET-3500-041	32 °F - 350 °F [0 °C - 117 °C]

BAKER ADAPTER KITS:

TOOL	PART NUMBER
No. 10	SET-5303-117
No. 20	SET-5303-120

SCHEMATIC AND BILL OF MATERIAL:

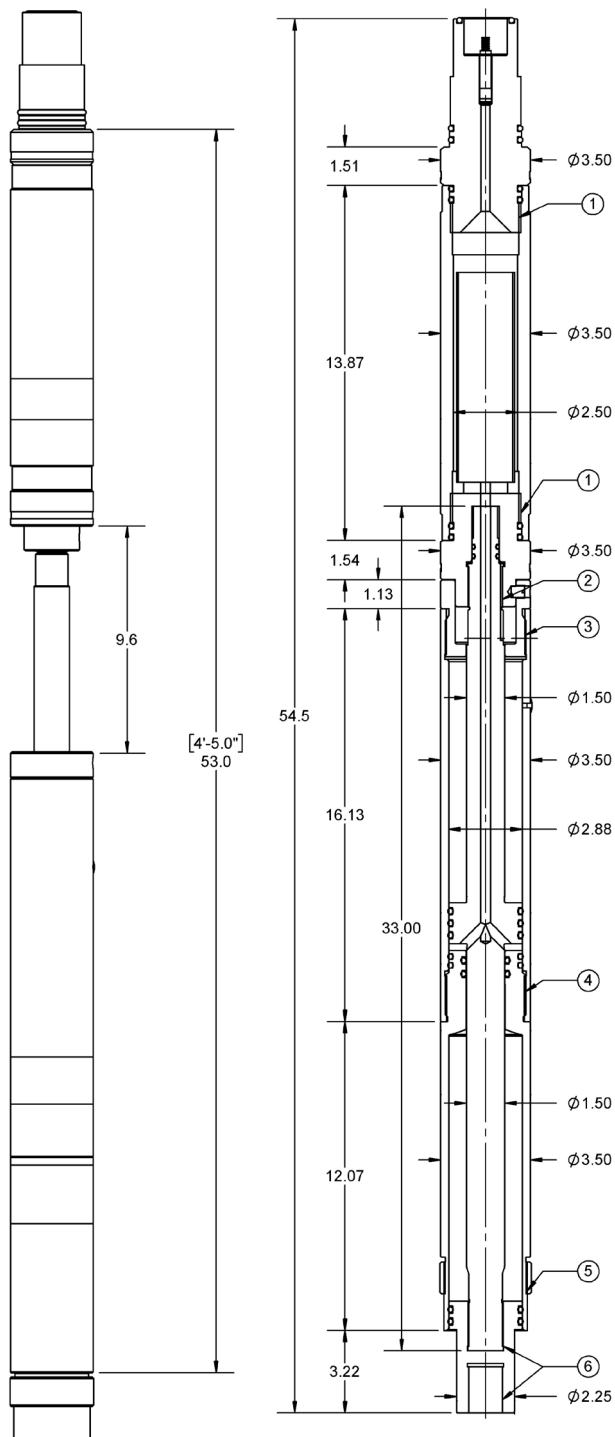


ITEM	QTY.	PART NUMBER	DESCRIPTION
1		SET-3500-000	3.5 INCH SETTING TOOL
	-		ITEMS 3 AND 6 NOT INCLUDED
2	1	OOO-V569-328	O-RING
3	1	DET-5306-074	074 IGNITER
		DET-5306-075	075 IGNITER
4	1	SET-3500-010	FIRING HEAD
5	13	OOO-V569-332	O-RING
6	1	JEC-5321-030	POWER CHARGE
		CPC-3500-000	
7	1	SET-3500-002	POWDER CHAMBER
8	2	OOO-V569-211	O-RING
9	1	SET-3500-003	SHEAR SUB
10	1	SET-3500-022	SHEAR PIN - 3-1/2IN BRASS SET. TOOL
11	1	SET-3500-004	SHEAR SLEEVE
12	1	SET-3500-006	PRESSURE CYLINDER
13	1	SET-3500-030	PLUG .200 NYLON
14	1	SET-3500-005	WORKING PISTON
15	2	OOO-V569-325	O-RING
16	1	SET-3500-007	BOTTOM CYLINDER
17	1	SET-3500-008	BOTTOM PISTON
18	1	SET-3500-009	LOCK RING
		AES-AS9000-28	ASSY - 3.25 INCH O.D. QUICK CHANGE

INSPECTION DIMENSIONS:



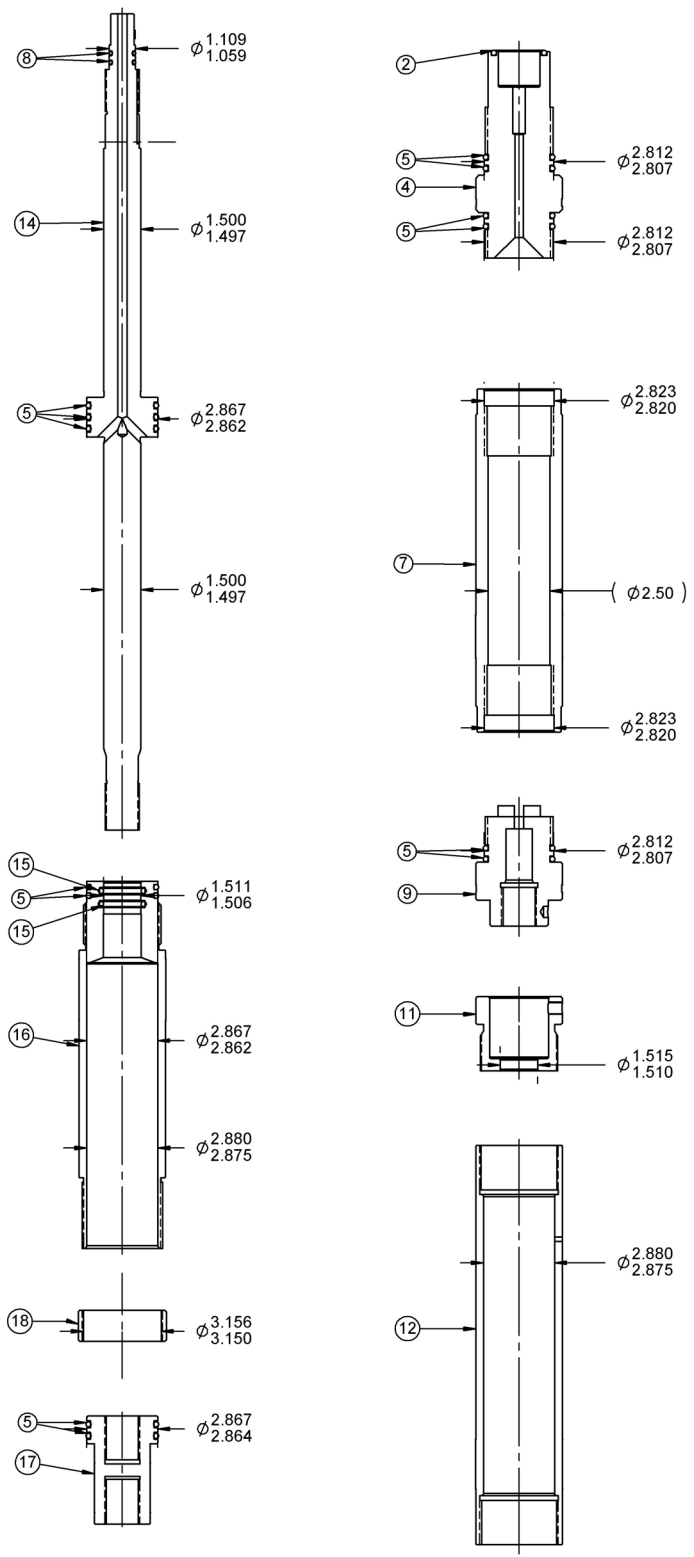
Note: *Inspect all sealing surfaces for corrosion or any other damage.*



CONNECTION STRENGTH:

CONNECTION	Tensile Strength (lbf, daN)	
1	413,000	183,712
2	136,000	60,496
3	580,000	257,997
4	635,000	282,462
5	144,000	64,054
6	166,000	73,840

FISHING DIMENSIONS:



1.0 Assembly Procedures



Warning: *Personal Protective Equipment (PPE) should be worn at all times!*



Warning: *Make sure all tool parts and components have been thoroughly cleaned or serious damage and/or injury could occur!*



Caution: *Make sure to wrench only on wrenching surfaces (knurled areas) provided! Always file wrench marks and burrs and clean off debris!*



Note: *Verify that the correct O-ring redress kit and quantities are used as specified on the Bill of Materials (for example, 5 each etc.). Lay out all redress kit components on a clean surface.*

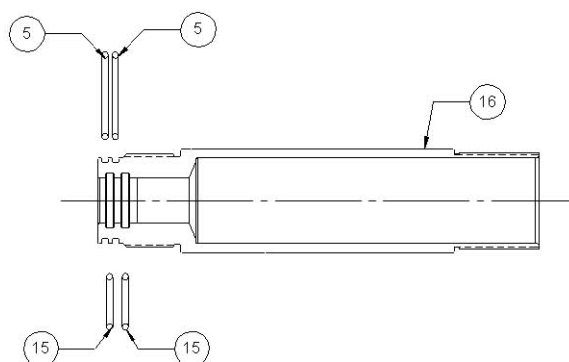


Note: *Make sure to lubricate all O-rings and threaded surfaces.*

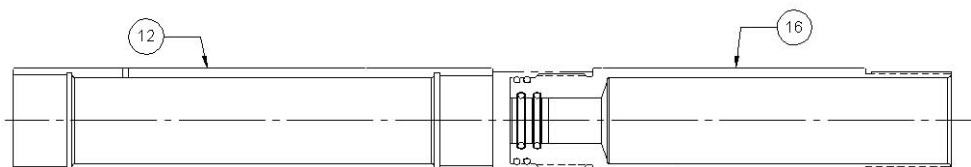


Note: *It is strongly recommended that MEMAC wrenches be used for assembly. These wrenches will not leave wrench marks when used on the knurled areas.*

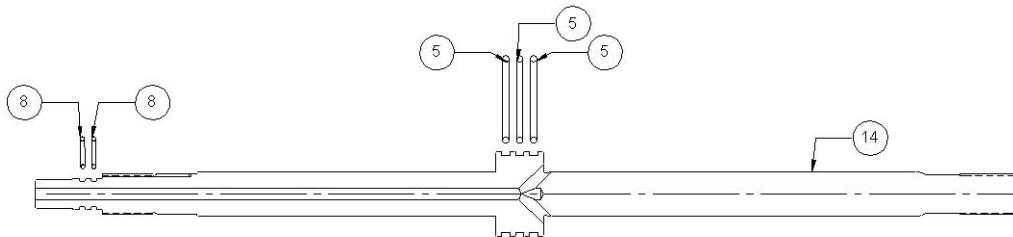
1.1 First, install O-Rings (Items #5 and #15) onto the Bottom Cylinder (Item #16).



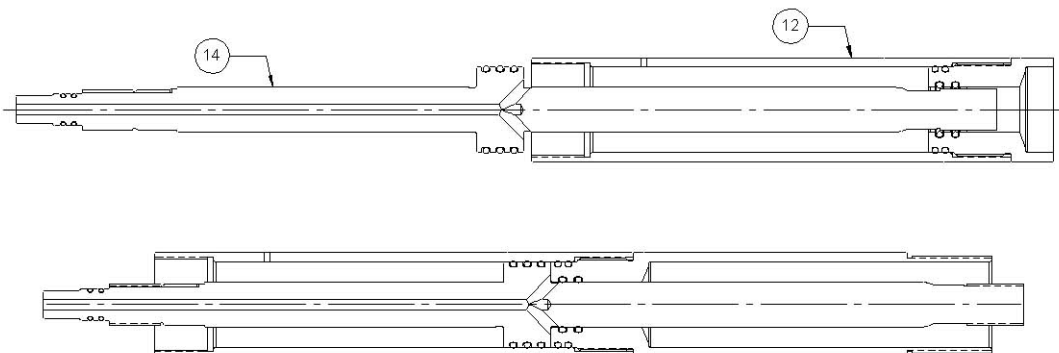
1.2 Place the Bottom Cylinder (Item #16) into a vice and screw on the Pressure Cylinder (Item #12)



1.3 Install O-Rings (Items #5 and #8) onto the Working Piston (Item #14)



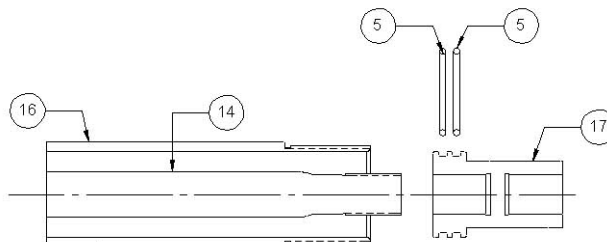
1.4 Lubricate the O-Rings on the Working Piston (Item #14) and place it into the Pressure Cylinder (Item #12). Remove the assembly and bottom out the Working Piston (Item #14) inside the Pressure Cylinder by dropping the top of the Working Piston (Item #14) on a wooden block or aluminum strike plate.



1.5 Install O-Rings (Item #5) onto the Bottom Piston (Item #17). Lubricate the O-Rings and screw on the Bottom Piston (Item #17) onto the Working Piston (Item #14).



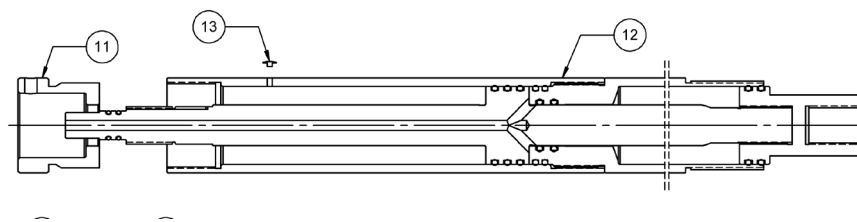
Caution: Do not over torque or the piston could be damaged!



1.6 Next, install the Nylon Plug (Item #13) and remove the setting tool from the vise and stand upright on the Bottom Piston (Item #17). Fill the Pressure Cylinder (Item #12) with approved SAE 10-40 oil until it reaches the groove at the end of the threads. Then screw the Shear Sleeve (Item #11) onto the Pressure Cylinder (Item #12).



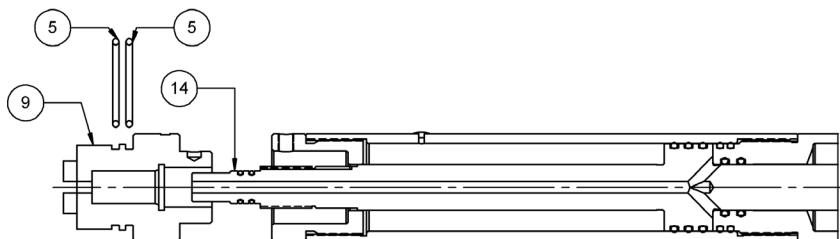
Note: Excess oil will purge out as the Shear Sleeve is screwed in.



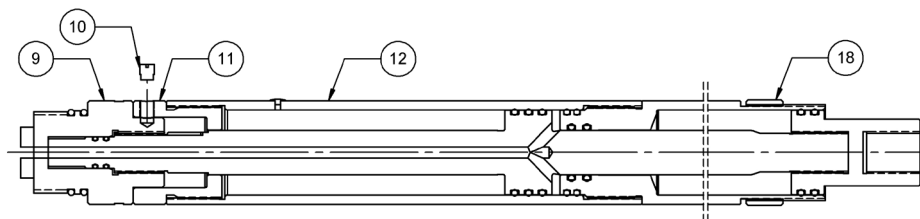
- 1.7 Place assembly back in the vise and install O-Rings (Item #5) onto the Shear Sub (Item #9). Screw the Shear Sub (Item #9) onto the Working Piston (Item #14).



Caution: Do not over torque or the piston could be damaged!



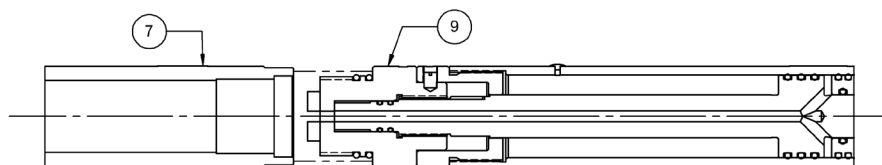
- 1.8 Turn the Shear Sub clockwise to align the holes in both the Shear Sub and Shear Sleeve. Install the Brass Shear Screw (Item #10) and attach the Lock Ring (Item #18).



- 1.9 To prevent shearing the Brass Shear Screw (Item #10) while installing the Powder Chamber (Item #7), move the setting tool down so that the Shear Sub (Item #9) is in the vise. Install Powder Chamber (Item #7) to the Shear Sub (Item #9) and make wrench tight.



Note: If the setting tool is being assembled for storage or transport the Nylon Plug (Item #13) and the connection between the Shear Sub (Item #9) and the Bottom Cylinder (Item #12) should be wrapped with black tape to prevent oil from leaking out.

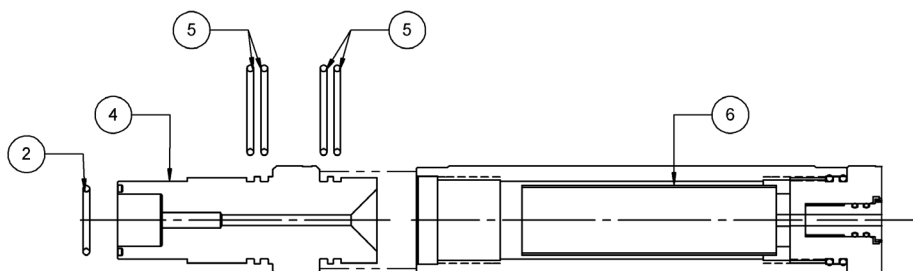


- 1.10 Next, remove end caps from the Power Charge and install it into the Powder Chamber, with pellet end facing upward toward the firing head.



Note: *The above statement is a suggested step, as always; please refer to your company's procedures for handling and installation of power charges (explosives or propellants)*

- 1.11 Install O-Rings (Item #2 and #5) onto the Firing Head (Item #4). Install the Firing Head into the Powder Chamber.



- 1.12 Install the preferred Firing Adapter to the top of the Firing Head (Item #4).



Warning: *Always follow American Petroleum Institute (API) RP-67 guidelines when handling and operating power charges!*



Warning: *Never pre-load, pre-dress or leave an assembled tool for extended periods. Redress and clean the tool prior to use. Never store a loaded tool!*



Note: *Clean and lubricate all parts immediately after each use.*



Note: *Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.*



Note: *It is recommended that Magnetic particle inspection (MPI) be completed on all components at least every 20 runs.*

2.0 Pre-Disassembly



Warning: *Although these setting tools are self-bleeding, after the tool has been fired, very high gas pressure may still be trapped or bridged inside the setting tool!*



Warning: *Safety glasses and Personal Protective Equipment (PPE) should be worn at all times! Be aware that the tool could be very hot!*

3.0 Manual Bleeding

- 3.1 If the gas pressure did not completely bleed at the self-bleeding hole in the ported Working Cylinder (Item #12), an alternate method is to manually bleed the setting tool at the Shear Sub (Item #9) and Working Piston (Item #14).

Hold back up on the Working Piston (Item #14) and slowly turn the Shear Sub (Item #9) **counter-clockwise** until pressure releases through the thread channel.



Note: *Once all gas pressure has been bled, the tool should be completely disassembled and all parts thoroughly washed in approved cleaner.*



Warning: *Gas pressure that may still be trapped or bridged inside the setting tool could be released during disassembly!*

4.0 Disassembly

- 4.1 After the gas pressure has been bled off, remove as one piece/section, the Shear Sub (Item #9), Powder Chamber (Item #7), Firing Head (Item #4) and Firing Head Adapter from the Working Piston (Item #14).
- 4.2 Remove the Shear Sleeve (Item #11) from Pressure Cylinder (Item #12). Remove the Brass Shear Screw (Item #10) from the Shear Sub and Shear Sleeve.
- 4.3 Take the Pressure Cylinder (Item #12), Bottom Cylinder (Item #16) and turn upside down and drop on a wooden block or aluminum strike plate to drive the Bottom Piston (Item #17) out of the Bottom Cylinder.
- 4.4 Place assembly in a vise, then remove the Bottom Piston (Item #17) from the Working Piston (Item #14).

- 4.5 Remove the Bottom Cylinder (Item #16) from the Pressure Cylinder (Item #12).
- 4.6 Take the Pressure Cylinder and Working Piston and drop on a wooden block or aluminum strike plate to remove the piston.
- 4.7 Place the Powder Chamber (Item #7) in a vise. Remove the Firing Adapter from the Firing Head (Item #4). Remove Firing Head and then remove the used Igniter Assembly (Item #3) from the Firing Head. Next, remove the Shear Sub (Item #9). Finally, remove the used Power Charge (Item #6) from the Powder Chamber (Item #7).
- 4.8 Remove and discard all O-Rings from pistons and subs. Replace O-Rings after each use. Thoroughly clean setting tool parts in a cleaner approved by state and/or local laws. For the tool to work properly make sure the Working Piston, Firing Head and Shear Sub inner diameter are clean of any debris. To make sure there are no restrictions, run a rod down the inner diameter or blow out with air, until air will pass through the piston ports. Make sure to clean all cylinder inner diameters.
- 4.9 Complete a visual inspection of all parts per the inspection and fishing dimensions. Visually inspect all surfaces where O-Rings seal, for scars and/or scratches. If visual inspection reveals damage that may lead to failure, replace parts immediately. Pick up pistons and inspect for damage, then drift through cylinders.



Warning: Always follow American Petroleum Institute (API RP-67) guidelines when handling and operating oil well explosives!



Note: Remove and discard all O-Rings. Replace O-Rings after each use. Thoroughly clean tool parts in a cleaner approved by state and/or local laws.



Note: Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.



Note: It is recommended that a Magnetic Particle Inspection (MPI) be completed on all components at least every 20 runs.