	STANDARD PROCEDURE SPECIFICATION	PROCEDURE:
	Field Installation of Jet Nozzles Steel and Matrix Body PDC Bits	REVISION: A
DATE:		
APPROVED:		
BY: Duane Shotwell		
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Scope

This document describes the correct method for installing tungsten carbide jet nozzles into steel body and matrix body PDC drill bits, for use in both traditional and high temperature (HT) wells which are greater than 300 °F (149 °C).

Purpose


Most nozzle failures are due to improper installation techniques. The most common mistakes made when installing jet nozzles include improper makeup torque, nozzle damage due to impact, debris in the nozzle recesses, using improper O-rings or damage to the O-rings from improper seating. By following the installation procedures described below, such mistakes can be avoided.

Equipment Required

- Nozzle Wrench (Part Nos. 100000127/100000128)
- O-rings (Part Nos. 100000956/100000957)
- Jet Nozzles (MZ or YZ Series)
- General Purpose Grease

- Loctite 242 (277 / 272 for HT wells)
- Loctite ODC Free Cleaner
- Lint free paper towels
- Gloves



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Procedure

1. Remove the bit from the box and stand on the API pin with the cutting structure facing up. For larger diameter bits (> 9-7/8”), and where no flat solid surfaces are available, it is acceptable to lay the bit on its side. See Figures 1 and 2.



Figure 1. Smaller Bits Face Up



Figure 2. Larger Bits Lay On Side


2. Carefully inspect all nozzles recesses for any debris or residue, on both the nozzle recess threads and the O-ring grooves. Use Loctite ODC Free cleaner and lint free towels to clean both thoroughly. See Figure 3 and 4.



Figure 3. Inspect Nozzle Recess Threads



Figure 4. Inspect Nozzle O-Ring

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- For previously jetted bits, insure that the O-ring is undamaged and fully seated in the O-ring groove. See Figure 5 and 6.



Figure 5. Damaged O-ring



Figure 6. O-Ring Not Seated


- Lightly grease the lower end of the jet nozzle body to prevent cutting of the O-ring during installation. Apply a thin coat of the appropriate Loctite around the full circumference of the first 2 – 3 threads only (the Loctite will spread to the remaining threads upon installation). See Figures 7 and 8.



Figure 7. Greasing Nozzle



Figure 8. Applying Loctite

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- Hand tighten the jet nozzle into the recess threads of the bit body as far as possible. Then using the nozzle wrench, continue to tighten until nozzle bottoms out. A slight resistance will be felt just before bottoming as the greased nozzle body compresses the O-ring into its groove. Any resistance prior to that should be checked by removing the nozzle and re-inspecting the recess for any residue and/or debris. See Figures 9 and 10.



Figure 9. Hand Tighten Nozzle

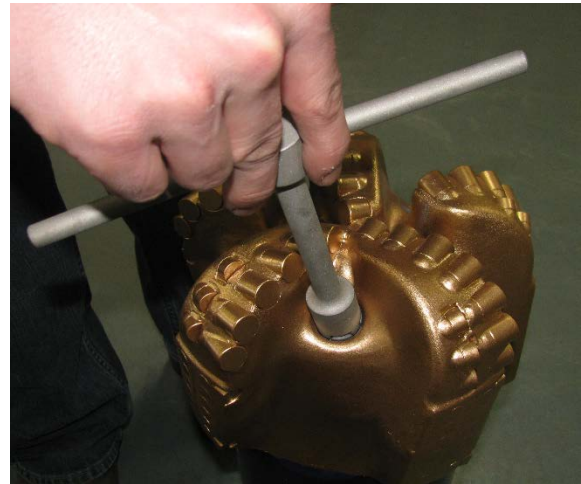


Figure 10. Use Wrench to Bottom Nozzle


- Once the jet nozzle has bottomed out in the nozzle recess, the appropriate torque should be applied using the nozzle wrench. If tightening by hand simply tighten as much as possible. Do not use a hammer or similar object to tighten the nozzle or breakage may occur. A standard torque wrench is recommended but not required. See Figures 11 and 12.



Figure 11. Nozzle Wrench



Figure 12. Torque Wrench

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6. If using a torque wrench, the minimum recommended torque is dependent on the size of nozzle and the body material of the bit (steel or matrix). See Table I.

	Steel Body	Matrix Body
MZ 50 Series	60 NM 45 lbf-ft	60 NM 45 lbf-ft
YZ 65 Series	90 NM 65 lbf-ft	80 NM 60 lbf-ft

Table I. Recommended Nozzle Torque

7. Loctite 242, 272 & 277 are anaerobic adhesives. They will begin curing immediately after the nozzle is installed. Cure time is accelerated by temperature, therefore there is no need for an additional waiting period.