

TIG Welder Tungsten Grinding and Collet Replacement PM

1.0 Maintenance Objective & Frequency

The objective of this procedure is to maintain consistent arc stability and weld quality by ensuring the tungsten electrode is properly ground to a sharp, concentric point and that the collet and collet body are free of contamination and wear. This PM also prevents arc wandering, tungsten contamination, and erratic arc starts caused by a worn or improperly seated collet.

Frequency: Every 40 hours of arc-on time or weekly, whichever comes first. Replace collet and collet body every 200 hours of arc-on time or when visual inspection reveals wear, pitting, or loss of grip.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Turn off the TIG welder at the main disconnect switch. Lock out and tag out the power source. Verify zero voltage with a multimeter at the output terminals.
- **Gas Isolation:** Close the argon cylinder valve. Bleed residual gas from the line by briefly opening the torch valve or pressing the gas purge button on the welder.
- **Thermal Hazard:** Allow the torch and tungsten to cool for at least 5 minutes after the last weld. Use a non-contact infrared thermometer to confirm temperature below 40°C before handling.
- **PPE:** Wear safety glasses with side shields, cut-resistant gloves, and a dust mask when grinding tungsten to avoid inhalation of tungsten dust.

3.0 Required Tools, Parts & Lubricants

- Tungsten electrode grinder (e.g., Piranha II or equivalent) with diamond grinding wheel (180-220 grit)
- Replacement collet (correct size for tungsten diameter, e.g., 1/16", 3/32", 1/8")
- Replacement collet body (if worn or damaged)
- Tungsten electrodes (2% thoriated, ceriated, or lanthanated as per weld procedure)
- Torch cleaning kit (wire brush, tip cleaner set)
- Anti-seize compound (copper-based, for collet threads)
- Digital caliper (0-150mm, 0.01mm resolution)
- Non-contact infrared thermometer
- Torque wrench (0-10 Nm, with appropriate bit for collet body nut)

4.0 Step-by-Step Maintenance Procedure

1. Perform LOTO as per Section 2.0. Confirm welder is off, gas is isolated, and torch is cool.
2. Remove the tungsten electrode from the torch by loosening the collet body nut with the appropriate wrench. Inspect the tungsten for contamination, cracks, or excessive wear. Discard if damaged.
3. Remove the collet and collet body from the torch. Inspect the collet for deformation, pitting, or loss of grip. Inspect the collet body for scoring, burrs, or wear on the internal taper. Replace both if any defects are found.

4. Clean the torch head, collet body threads, and collet body nut using the torch cleaning kit. Remove any oxide buildup or debris. Apply a thin layer of anti-seize compound to the collet body threads.
5. Install the new or cleaned collet into the collet body. Ensure the collet is fully seated and oriented correctly (taper matches). Insert the new tungsten electrode through the collet and collet body, leaving approximately 1/4" (6mm) protruding beyond the collet body face.
6. Tighten the collet body nut by hand until snug, then torque to 4-5 Nm using the torque wrench. Do not overtighten, as this can deform the collet or damage the torch threads.
7. Grind the tungsten electrode using the dedicated grinder. Set the grinder to the desired angle (typically 15-30 degrees for DC welding, 45-60 degrees for AC welding). Grind longitudinally (parallel to the electrode axis) to create a sharp, concentric point. Avoid grinding perpendicular to the axis.
8. Inspect the ground tip under magnification (10x loupe). The point should be sharp, free of burrs, and concentric with the electrode diameter. Measure the tip diameter using the digital caliper; it should be approximately 0.5mm for a 1/16" electrode, or as specified by the weld procedure.
9. Reinstall the tungsten electrode into the torch. Adjust the stickout to the required length (typically 1/4" to 3/8" beyond the gas nozzle). Tighten the collet body nut to 4-5 Nm.
10. Inspect the gas nozzle for cracks, spatter buildup, or damage. Clean or replace as necessary. Ensure the gas lens (if used) is clean and free of obstructions.

5.0 Verification & Return to Service

1. Remove LOTO tags and locks. Restore power to the welder and open the argon cylinder valve. Set gas flow to 15-20 CFH.
2. Perform a gas purge test: Press the gas purge button and listen for steady gas flow. Check for leaks at the torch connections using a soapy water solution.
3. Perform a test weld on a scrap piece of the same material. Verify arc start is immediate and stable, with no arc wandering or erratic behavior. Weld a 2-inch bead and inspect for consistent penetration and minimal tungsten inclusion.
4. If the arc is unstable or the weld quality is poor, re-inspect the collet and tungsten for proper seating and grind quality. Repeat steps as necessary.
5. Record the PM completion in ServiceGrid, including hours of arc-on time, condition of replaced parts, and any observations. Sign off on the work order.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.