

Spot Welder Electrode Dressing and Tip Alignment PM

1.0 Maintenance Objective & Frequency

The objective of this procedure is to dress the electrode tips to restore their original geometry and ensure proper alignment between the upper and lower electrodes. This prevents weld expulsion, inconsistent nugget size, and premature electrode failure. This PM is to be performed every 8 hours of continuous operation or at the start of each shift, whichever comes first.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect the main power supply to the spot welder and apply a personal lockout tagout device on the disconnect switch.
- **Pneumatic Isolation:** Close the shut-off valve on the compressed air supply line and bleed any residual pressure from the system by actuating the weld head manually (with power off) until no air is heard.
- **Cooling Water Isolation:** If water-cooled, close the coolant supply and return valves. Verify no flow by checking the sight glass or flow indicator.
- **Mandatory PPE:** Wear safety glasses with side shields, cut-resistant gloves, and hearing protection. If dressing produces metal dust, wear a dust mask.

3.0 Required Tools, Parts & Lubricants

- Electrode dresser (manual or pneumatic, with appropriate cutter size for the electrode tip diameter)
- Feeler gauge set (0.001-0.030 inch range)
- Dial indicator with magnetic base (0.001 inch resolution)
- Torque wrench (0-50 in-lb range)
- Clean lint-free cloths
- Anti-seize compound (copper-based, high-temperature rated)
- Replacement electrode tips (if dressing cannot restore geometry)

4.0 Step-by-Step Maintenance Procedure

1. Verify LOTO is applied: confirm main power disconnect is locked out, pneumatic supply valve is closed and locked, and all residual energy is bled.
2. Inspect the electrode tips visually for pitting, mushrooming, or excessive wear. If the tip face diameter has increased by more than 20% of the original diameter, proceed with dressing. If the tip is severely damaged, replace with a new tip.
3. Clean the electrode tips and the surrounding area with a lint-free cloth to remove any weld splatter, oil, or debris.
4. Install the appropriate cutter into the electrode dresser. Ensure the cutter is sharp and free of damage. Apply a small amount of anti-seize compound to the cutter threads if using a manual dresser.

5. Position the dresser between the upper and lower electrodes. Manually or pneumatically close the electrodes onto the dresser until the cutter contacts the tip face. Apply steady pressure and rotate the dresser (if manual) or activate the pneumatic cycle (if automatic) to dress the tip. Perform 2-3 full rotations or cycles to restore the tip to its original geometry.
6. Remove the dresser and inspect the dressed tip. The face should be clean, flat, and free of pits or burns. The diameter should match the original specification (e.g., 0.250 inch for a standard tip). Use a caliper to verify if needed.
7. Repeat steps 4-6 for the lower electrode if it is also dressed. If only the upper electrode is dressed, ensure the lower electrode is clean and free of debris.
8. Check electrode alignment: With the electrodes closed (no workpiece), use a feeler gauge to measure the gap between the electrode faces at the front, back, left, and right. The gap should be uniform within 0.002 inch. If not, proceed to alignment adjustment.
9. To adjust alignment, loosen the locking bolts on the electrode holder (typically 2 bolts per holder) using a torque wrench set to the manufacturer's specification (e.g., 25 in-lb). Gently tap the holder with a soft mallet to shift the electrode until the feeler gauge shows uniform gap. Retighten the bolts to the specified torque.
10. Verify alignment with a dial indicator: Mount the dial indicator on the lower electrode holder and zero the plunger against the upper electrode face. Manually cycle the weld head through a full stroke. The runout should not exceed 0.003 inch total indicated reading (TIR). If runout exceeds this, repeat step 9.
11. Apply a thin film of anti-seize compound to the electrode taper or shank before reinstalling any removed tips. This prevents galling and makes future removal easier.
12. Clean all tools and the work area. Remove any metal dust or debris from the dresser and surrounding surfaces.

5.0 Verification & Return to Service

1. Remove all LOTO devices and restore power, pneumatic, and coolant supplies in the reverse order of isolation.
2. Perform a dry cycle test: Close the electrodes without a workpiece and observe the alignment visually. Listen for any unusual sounds (e.g., binding or scraping).
3. Run a test weld on a scrap piece of the same material and thickness as production. Set the weld parameters (current, time, pressure) to standard production values. Weld 3 test coupons.
4. Inspect the test welds: Perform a peel test or chisel test to verify nugget size and strength. The nugget diameter should be at least 4 times the material thickness (e.g., for 0.060 inch material, nugget should be 0.240 inch minimum).
5. If test welds pass, the machine is cleared for production. Document the PM completion in ServiceGrid, including any dressing or alignment adjustments made, and note the condition of the electrodes.
6. If test welds fail, re-inspect electrode condition and alignment. Repeat dressing or alignment as needed. If the issue persists, escalate to the maintenance supervisor for further troubleshooting.

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.