

Air Cap Pattern Test For HVLP Gun

1.0 Maintenance Objective & Frequency

The objective of this procedure is to verify and calibrate the air cap pattern of an HVLP (High Volume Low Pressure) spray gun to ensure uniform paint atomization, consistent fan width, and defect-free coating application. A proper pattern test prevents orange peel, runs, sags, and dry spray, which directly reduces rework and material waste.

This test should be performed at the start of each production shift, after any nozzle or air cap replacement, and whenever a coating defect is suspected. Frequency: Daily or per batch change.

2.0 Lockout/Tagout (LOTO) & Safety

- **Pneumatic Isolation:** Disconnect the compressed air supply line at the quick-connect fitting and bleed any residual pressure from the gun body by pulling the trigger while pointing the gun into a waste container.
- **Fluid Isolation:** Close the fluid supply valve (if using a pressure pot) or remove the paint cup and empty any remaining material into a proper waste container.
- **PPE Requirements:** Wear chemical-resistant gloves, safety glasses with side shields, and a NIOSH-approved organic vapor respirator. Ensure the spray booth ventilation is active.
- **Fire Safety:** Ensure no ignition sources are present. Keep a fire extinguisher rated for Class B (flammable liquids) within reach.

3.0 Required Tools, Parts & Lubricants

- HVLP spray gun (complete assembly)
- Test panel (clean, white cardboard or metal panel, approximately 12" x 12")
- Paint or test fluid (viscosity matched to production material, typically 20-25 seconds in a Zahn #2 cup)
- Air pressure regulator with gauge (0-60 psi range, accurate to ± 1 psi)
- Fluid pressure regulator (if using pressure feed system)
- Ruler or measuring tape (metric or imperial)
- Clean rags or lint-free wipes
- Spray booth with adequate ventilation and lighting
- Personal protective equipment (PPE) as listed in Section 2.0

4.0 Step-by-Step Maintenance Procedure

1. Ensure the spray gun is clean and free of dried paint. Remove the air cap and nozzle assembly, inspect for damage or wear, and clean with appropriate solvent if necessary. Reassemble hand-tight only.
2. Connect the spray gun to the compressed air supply. Set the inlet air pressure to the manufacturer's recommended value (typically 10-30 psi for HVLP guns). Use the air pressure regulator to achieve the exact pressure.

3. Fill the paint cup or connect the fluid supply with test fluid. If using a pressure pot, set the fluid pressure to the recommended starting point (usually 1-5 psi).
4. Hold the spray gun perpendicular to the test panel at the manufacturer's recommended distance (typically 6-8 inches). Trigger the gun briefly (1-2 seconds) to apply a single horizontal pass across the center of the panel.
5. Observe the pattern shape. A correct pattern should be an even, elongated oval with a consistent width (typically 6-10 inches depending on the gun). The pattern should have a uniform distribution of droplets with no heavy center or edges.
6. Measure the pattern width using a ruler. Compare to the manufacturer's specification. If the pattern is too narrow, increase the air pressure slightly (1-2 psi increments). If too wide, decrease air pressure. Re-test after each adjustment.
7. Check for pattern defects: a 'tailing' or 'hourglass' shape indicates a partially clogged air cap horn. Remove the air cap and clean the horn holes with a non-metallic pick. Re-test.
8. Check for spitting or sputtering: this indicates air in the fluid line or a loose fluid nozzle. Tighten the fluid nozzle to 15-20 in-lbs (1.7-2.3 Nm) using a torque wrench if available. Bleed any air from the fluid line.
9. If the pattern is consistently heavy on one side, rotate the air cap 180 degrees and re-test. If the heavy side moves, the air cap is damaged or clogged. Clean or replace the air cap.
10. Once the pattern is uniform and within specification, lock the air pressure regulator setting. Record the final air pressure and fluid pressure (if applicable) on the PM work order.

5.0 Verification & Return to Service

1. Perform a final test spray on a production-representative part or scrap panel. Verify that the coating thickness, appearance, and coverage meet quality standards.
2. Clean the spray gun thoroughly using the manufacturer's recommended cleaning procedure to prevent paint from drying in the fluid passages.
3. Disconnect the air supply and fluid supply. Store the gun in a clean, dry location.
4. Document the test results, including air pressure, fluid pressure, pattern width, and any corrective actions taken, in the ServiceGrid PM work order.
5. Sign off on the PM work order in ServiceGrid to confirm the gun is ready for production.

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.