

Finish Adhesion Cross Hatch Test Procedure

1.0 Maintenance Objective & Frequency

The objective of this procedure is to perform a standardized cross hatch adhesion test on finished painted or coated surfaces to verify the bond integrity of the coating system. This test identifies potential adhesion failures that could lead to delamination, blistering, or premature coating failure in service. The test is performed on a representative sample or in-situ on the finished part as part of quality assurance or after any process change (e.g., substrate preparation, paint batch, cure cycle). Frequency is per production lot, after process changes, or as specified by the quality plan (typically once per shift or per batch).

This procedure is based on ASTM D3359 Method B (Cross-Cut Tape Test) and ISO 2409. It is intended for coatings up to 125 µm (5 mils) thickness. For thicker coatings, refer to ASTM D3359 Method A (X-Cut Tape Test).

2.0 Lockout/Tagout (LOTO) & Safety

- No machine lockout is required for this test as it is performed on a finished part or sample. However, ensure the part is stable and secure to prevent movement during cutting.
- Wear cut-resistant gloves (e.g., ANSI A4 level) when handling the cutting tool to prevent lacerations.
- Wear safety glasses to protect against flying debris or accidental tool slip.
- Ensure adequate ventilation if testing in an enclosed area with solvent-based coatings or cleaning agents.
- Dispose of used tape and any coating debris in accordance with local waste regulations.

3.0 Required Tools, Parts & Lubricants

- Cross hatch cutter (multi-blade tool with 6 cutting edges, 1 mm or 2 mm spacing depending on coating thickness; e.g., Elcometer 1542 or BYK Gardner 5120). For coatings < 60 µm use 1 mm spacing; for 60–125 µm use 2 mm spacing.
- Pressure-sensitive tape (e.g., 3M #250 or Permacel P-99, 25 mm wide, adhesion strength per ASTM D3359).
- Soft brush or compressed air (to remove loose coating debris).
- Magnifying glass or 10x loupe (for inspection of cut area).
- Ruler or template (optional, for ensuring straight cuts).
- Cleaning solvent (isopropyl alcohol or acetone) and lint-free wipes.
- Test report form or digital data entry device (e.g., tablet with ServiceGrid).

4.0 Step-by-Step Maintenance Procedure

1. Select a test area on the coated surface that is representative of the overall finish. The area should be flat, free of surface defects, and at least 25 mm from any edge. Clean the area with isopropyl alcohol and a lint-free wipe to remove any dirt, oil, or loose particles. Allow to dry completely.
2. Place the cross hatch cutter perpendicular to the coating surface. Apply steady, even pressure and make a single continuous cut approximately 20 mm long. Use a ruler or template if needed to ensure straightness. Repeat to create a

second cut perpendicular to the first, forming a lattice of 6 parallel cuts in each direction (total 11 cuts). The cuts must penetrate through the coating to the substrate.

3. After cutting, use a soft brush or gentle compressed air to remove any loose coating flakes from the cut area. Do not touch the cut area with fingers.
4. Inspect the cutting tool blades for wear or damage. If any blade is chipped or dull, replace the cutter head before proceeding. Dull blades can cause tearing rather than clean cuts, invalidating the test.
5. Cut a 75 mm length of pressure-sensitive tape. Place the tape firmly over the cross hatch grid, ensuring full contact. Use a pencil eraser or your fingernail to rub the tape firmly onto the grid, ensuring no air bubbles. The tape should extend at least 20 mm beyond the grid on all sides.
6. Wait 90 ± 30 seconds after tape application. Then, grasp the free end of the tape and pull it back rapidly at an angle of approximately 180° (i.e., back over itself) in one smooth, continuous motion. Do not jerk or pause.
7. Immediately after removal, examine the grid area under a magnifying glass or 10x loupe. Count the number of squares that have detached (i.e., coating removed from the substrate). Also note any coating removed along the cut lines.
8. Classify the adhesion result according to the ASTM D3359 rating scale (0B to 5B) or ISO 2409 rating (0 to 5). Record the rating on the test report. For reference: 5B/0 = no detachment; 4B/1 = trace detachment at intersections; 3B/2 = less than 15% area affected; 2B/3 = 15–35% area affected; 1B/4 = 35–65% area affected; 0B/5 = greater than 65% area affected.
9. If the test is performed on a production part, mark the test location with a permanent marker or label to indicate it has been tested. Do not test in a visible area if the part is cosmetic.
10. Clean the test area with solvent to remove any tape residue. If the test was destructive (coating removed), note the location for future touch-up or rework as per the quality plan.

5.0 Verification & Return to Service

1. Verify that the test result meets the acceptance criteria defined in the quality plan or customer specification. Typical acceptance for industrial coatings is 3B/2 or better (less than 15% area removed). If the result is below the acceptable level, reject the lot and initiate a non-conformance report (NCR).
2. If the test was performed on a sample coupon, discard the coupon. If on a production part, ensure the test area is cleaned and any exposed substrate is protected (e.g., with touch-up paint) per the rework procedure.
3. Document the test results in the quality log or CMMS (ServiceGrid). Include: date, operator name, part/lot number, coating type, substrate, test location, rating, and any observations (e.g., type of failure: adhesive vs. cohesive).
4. Return the part to production only after the test area has been cleaned and, if necessary, reworked. If the part is a sample, no return is needed.
5. If the test fails, notify the coating process engineer immediately. Do not release the affected lot until root cause analysis and corrective action are completed.

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.