Cross Hatch Ink Adhesion Tape Test

Instructional Bulletin #3.05 (Revision 0)
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1.0 Scope

In order to perform satisfactorily, coatings must adhere to the substrates on which they are applied. The cross-cut test is one method used to assess the resistance of paints, inks, and coatings to separate from the substrate to which they are applied.

This method specifies a procedure for assessing the resistance of inks, paints, and other coatings to separation from substrates when a right-angle lattice pattern is cut into the coating, penetrating through to the substrate. The method may be used for a quick pass/fail test. When applied to a multi-coat system, assessment of the resistance to separation of individual layers of the coating/ink from each other may be made.

2.0 Test Equipment

- Multiple-tooth adhesion cutter – sources listed at end of procedure
- 3M 610 Test Tape (1” (2.54 cm) width)
- Soft brush or tissue (to remove any detached coating/ink flakes)
- Plastic Squeegee to smooth down tape
- Aluminum shrink panels

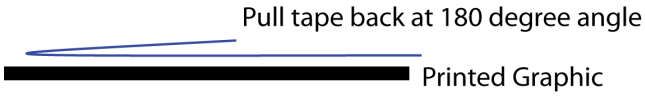
3.0 Initial Preparation

Make sure samples to be tested are at room temperature (22 ± 2°C, 72 ± 4°F). For ultimate adhesion allow samples to dwell 24 hours at room temperature after coating/curing to ensure curing has completed, then laminate samples to cleaned aluminum shrinkage panels for testing.

4.0 Cross Hatch Steps

1. Place sample to be tested on smooth flat base to insure adequate support.
2. Place the cutter assembly on the test specimen so that it rests on the nylon protector and the rear (narrow end) on the handle.
3. Grasp the handle and rotate it upward with respect to the line of contact of the nylon guide with the test surface. During this motion, the tips of the cutter first contact the test surface when the top of the handle is about 7° with respect to the test surface. Continue this motion until the top surface of the handle is elevated to about 15°. This is the correct attitude of the cutter for this test.

4. With enough pressure on the handle to insure that all of the cutter tips penetrate to the test specimen supporting base, pull the assembly along the test surface through 0.75 to 1.00 inch (1.90 to 2.54 cm).
5. Repeat this procedure with a second cut intersecting the first pattern at 90°.
6. After making the required cuts, brush the surface lightly with a soft brush to remove any detached flakes or pieces of coatings.
7.
8. Remove about 3” (7.5 cm) of tape from the spool and place the center of the tape over the grid area and smooth down with finger (leave enough tape at end to fold over itself and create tab). To ensure good contact with the film/coating, apply the tape with 3 even and firm strokes with a plastic Avery squeegee. Having uniform color under the tape is a useful indication of when good contact has been made.
9. After 60 seconds, remove the tape by pulling the free end (tab) rapidly (in a smooth motion) at a 180° angle.



10. Inspect the grid area for removal of coating/ink from the substrate or from a previous coating using an illuminated magnifier. Rate the coating adhesion in accordance with the scale in the appendix.

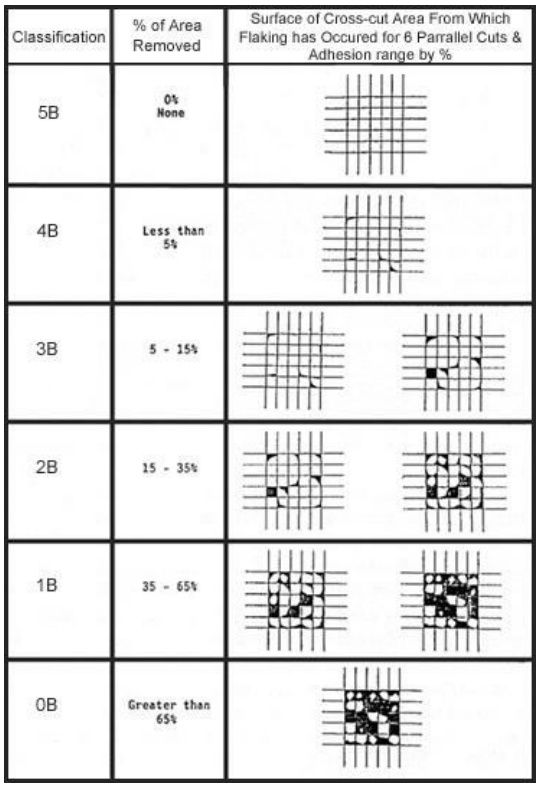
11. Repeat the test in two other locations on each test panel to obtain an average of 3 testing results.

12. For reference, the following adhesion ratings are the typical product requirements for Graphics and Reflective products. A rating of 4B to 5B is preferred, 3B or less is unacceptable.

CHANGE TO MY OWN PHOTO
Add photo of or drawing to show pull at 180 degree angle

5.0 Description of Classification Ratings

- 5B - The edges of the cuts are completely smooth, none of the squares of the lattice are detached.
- 4B - Small flakes of the coating are detached at intersections: less than 5% of the area is affected.
- 3B - Small flakes of the coating are detached along the edges and at intersections of the cuts. The area affected is 5 to 15% of the lattice.
- 2B - The coating has flaked along the edges and on parts of the squares. The area affected is 15 to 35% of the lattice.
- 1B - The coating has flaked along the edges of cuts in large ribbons and whole squares have detached. The area affected is 35 to 65% of the lattice.
- 0B - Flaking and detachment worse than Grade 1B.



6.0 Test Precision: Reproducibility/Repeatability

- **Repeatability** - If adhesion is uniform over the surface being tested, results obtained for two measurements by the same operator should not differ by more than one rating category.

- **Reproducibility** - Test results obtained by different operators (each the mean of three measurements) should not differ by more than two rating categories.

7.0 Contact Information

Cross-Hatch kits or cutters can be purchased from the following locations:

Paul N. Gardner Co., Inc.
316 NE First St.
Pompano Beach, FL 33060
(800) 762-2478
www.gardco.com

BYK Gardner Instruments USA
9104 Guilford Rd.
Columbia, MD 21046
(800) 343-7721
www.bykgardner.com

Precision Gage & Tool Co.
375 Gargrave Road
Dayton, OH 45449
(937) 866-9666
www.precisiongage-tool.com