

FIELD EVALUATION OF COATING ADHESION

Coating adhesion is critical to long-term performance and durability of architectural coating systems. Poor adhesion can lead to delamination, premature coating failure, and aesthetic issues. For field evaluations, qualitative adhesion tests such as ASTM D3359 Method A (X-cut tape test) and ASTM D6677 (knife probe test) provide practical, standardized means to assess whether a coating adheres adequately to its substrate or the surface to which it was applied. Each method has distinct procedures, rating systems, and appropriate use cases depending on assessment needs.

ASTM D3359 Method A (X-Cut Tape Test)

ASTM D3359 provides standardized tape-test methods to assess coating adhesion by cutting through the film, applying pressure-sensitive tape, and removing it quickly to measure how much coating is removed. Method A (the X-cut test) is primarily used in the field.

The procedure for the X-Cut Tape Test is as follows:

1. Choose a spot where the coating is fully dry/cured and free of visible defects.
2. Using a sharp blade and straightedge, make two ~1.5-inch cuts through the coating to the substrate so they intersect to form an “X” at a 30–45° intersection angle (Figure 1a).
3. Apply a 3-inch piece of pressure-sensitive tape to the X-cut and rub it firmly on the surface to ensure good contact, preferably using the eraser on the end of a pencil.
4. Wait about 60 seconds, then pull the tape off quickly but smoothly, folding it back over itself at roughly 180-degree angle (Figure 1b).

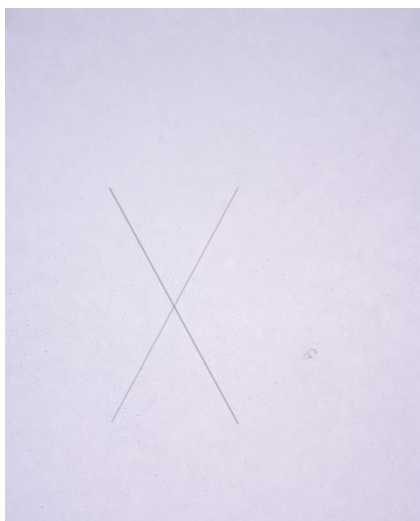


Figure 1a

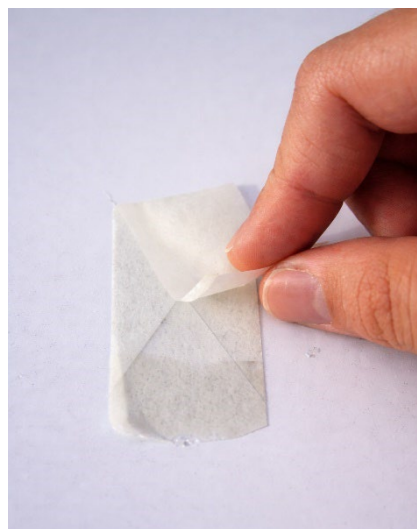


Figure 1b

Images adapted from ASTM D3359 X-Cut adhesion testing procedure.

5. After tape removal, rate adhesion by the amount of coating removed from the substrate or underlying coat using the scale below. Evaluate the test area on the coated surface—not the tape backing—since incision debris is often picked up by the tape.
6. Perform the test on two additional spots at the same test location (three total tests per location).

Rating		Surface of X-cut from which flaking or peeling has occurred
5A	No removal	None
4A	Trace removal along the cuts or at their intersection	
3A	Jagged removal along the cuts up to 1/16" on either side	
2A	Jagged removal along most of the cuts up to 1/8" on either side	
1A	Removal from most of the area of the X-cut under the tape	
0A	Removal beyond the area of the X cut	

ASTM D6677 – Knife Adhesion Test

ASTM D6677 offers a qualitative assessment of coating adhesion by probing the cured film with the tip of a knife and evaluating how easily it can be lifted from the surface. Because the method relies on cutting and lifting rather than tape adhesion, it is useful in situations where the tape test method may be unreliable. For example, heavily chalked coatings can produce misleading results because the tape may remove only the friable chalk layer while the coating system remains in place, potentially masking poor adhesion. If a tape adhesion test is required, the chalking should be removed from the test area before testing. Otherwise, the knife test is typically a better indicator of the coating's adhesion to the substrate or the surface to which it was applied.

The ASTM D6677 procedure is similar to ASTM D3359 Method A, but no tape is applied. After making the "X" cut, use the knife tip to probe at the intersection (Figure 2) and assign an adhesion rating from 10 to 0 (per the chart below).

Rating	Description
10	Coating is extremely difficult to remove. Fragments no larger than $\frac{1}{32}$ " x $\frac{1}{32}$ " removed with great difficulty
8	Coating is difficult to remove. Coating chips from $\frac{1}{16}$ " x $\frac{1}{16}$ " to $\frac{1}{8}$ " x $\frac{1}{8}$ " removed with difficulty
6	Coating is somewhat difficult to remove. Coating chips from $\frac{1}{8}$ " x $\frac{1}{8}$ " to $\frac{1}{4}$ " x $\frac{1}{4}$ " removed with slight difficulty
4	Coating is somewhat difficult to remove. Coating chips in excess of $\frac{1}{4}$ " x $\frac{1}{4}$ " removed using light pressure with knife blade
2	Coating is easy to remove. Once started with the knife blade, the coating can be grasped with fingers and easily peeled to a length of at least $\frac{1}{4}$ "
0	Coating is easy to remove. Once started with the knife blade, the coating can be grasped with fingers and easily peeled to a length greater than $\frac{1}{4}$ "

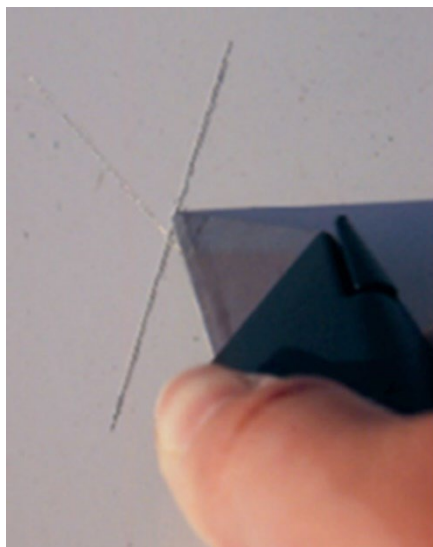


Figure 2. Adapted from ASTM D6677 knife adhesion testing procedure.

WORKS CITED

ASTM International. *ASTM D3359-23: Standard Test Methods for Rating Adhesion by Tape Test*. ASTM International, 2023.

ASTM International. *ASTM D6677-21: Standard Test Method for Evaluating Adhesion by Knife*. ASTM International, 2021.

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