



Standard Test Method for Acid and Mortar Resistance of Factory-Applied Clear Coatings on Extruded Aluminum Products¹

This standard is issued under the fixed designation D 3260; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method covers the evaluation of the mortar and acid resistance of clear protective coating factory applied to extruded aluminum substrates.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 207 Specification for Hydrated Lime for Masonry Purposes²

D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels³

3. Summary of Test Method

3.1 Panels that have been buffed, cleaned, neutralized, and coated with the material being evaluated are exposed to freshly prepared mortar and to a hydrochloric acid solution.

4. Significance and Use

4.1 This test method will provide differentiation between types of coatings for acid and motor resistance providing the coating is applied in a uniform continuous film with a specified film thickness.

5. Reagents

5.1 *Acid*—Ten volume percent solution of commercialgrade hydrochloric acid (31.4 to 31.8 % HCl, 20°Bé) in distilled water.

5.2 *Cleaning Solution*—An alkaline cleaner⁴ in the concentration recommended by the manufacturer, usually 45 to 60 g/L

(6 to 8 oz/gal) of water. The pH of the solution should be between 11.4 and 12.2.

5.3 *Lime*—Building lime complying with Specification C 207.

5.4 *Neutralizing Solution*—Prepare from a stable free-flowing, granular material having a chromate base⁵ as recommended by the supplier, usually at a concentration of 90 to 120 g/L (12 to 16 oz/gal) of water.

5.5 *Sand*—Dry sand capable of passing through a 10-mesh wire screen.

6. Test Panels

6.1 Panels of extruded aluminum alloy No. 6063-T5 with dimensions 150 by 75 by 6.3 mm (6 by 3 by 1/4 in.) shall be used for the test.

7. Procedure

7.1 *Preparation of Test Panels:*

7.1.1 Buff the aluminum panels and remove the buffing compound with an organic solvent.

7.1.2 Immerse the panels in cleaning solution (5.2) for 1 h at a temperature of 93°C (200°F).

7.1.3 Rinse the panels in tap water having a pH of 6.5 to 7.5 until the surface is free of water break. Use reagent water for rinsing if the pH of the tap water is outside the specified limits. The panels shall be free from evidence of corrosion or surface attack.

7.1.4 Immerse the panels in neutralizing solution (5.4) at 24 ± 1°C (75 ± 2°F) for 30 s to neutralize any retained alkalinity and to promote adhesion of the applied coatings.

7.1.5 Rinse the panels in reagent water and allow them to dry a minimum of 1 h before coating.

7.2 *Coating of Test Panels:*

7.2.1 Apply the coatings being evaluated to the test panels in a uniform continuous film by automatic spray equipment in accordance with Method A of Practices D 823.

7.2.2 For the mortar test, spray two panels on one side with two or more full wet coats to produce a minimum dry film thickness of 15 µm (0.6 mil) and two panels with one or more full wet coats to produce a minimum dry film thickness of 7.5 µm (0.3 mi).

7.2.3 For the acid test, spray two panels with two or more

¹ This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.55 on Factory-Applied Coatings on Preformed Products.

Current edition approved May 10, 2001. Published July 2001. Originally published as D 3260 – 73. Last previous edition D 3260 – 82 (1996)^{ε1}.

² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 06.01.

⁴ Diversey No. 808 has been found satisfactory for this purpose.

⁵ Diversey No. 814 has been found satisfactory for this purpose.

full wet coats, on both sides, to produce a minimum dry film thickness of 0.6 mil (15 μm) and two panels with one or more full wet coats on *both* sides to a minimum dry film thickness of 7.5 μm (0.3 mil).

7.2.4 Allow the panels to dry for 7 days at $23 \pm 2^\circ\text{C}$ ($73 \pm 3.5^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

7.3 Mortar Test:

7.3.1 Prepare freshly mixed mortar by dry mixing 75 g of building lime (5.3) and 225 g of sand (5.5) and adding sufficient reagent water while stirring to make a soft paste that can be formed into a firm mortar patty approximately 40 mm (1½ in.) in diameter and 6 mm (¼ in.) thick.

7.3.2 Apply the mortar to the top and bottom areas of the test panels and, without drying, immediately expose them for 7 days at 95 to 98 % relative humidity at a temperature of $21 \pm 2^\circ\text{C}$ ($70 \pm 3.5^\circ\text{F}$) in an automatically controlled cabinet.

7.3.3 At the end of 7 days take the panels from the test cabinet and immediately dislodge the mortar patties from the panels using a damp cloth to remove any residue.

7.3.4 View the surface of the panels perpendicular to the surface under a diffused light source providing a minimum

light intensity at the surface of 2150 lx (200 fc). Examine for blistering, peeling, lifting, crazing, flaking, or discoloration of the coating, and for corrosion of the coated part of the aluminum panel. Three observers shall evaluate each panel and the majority assessment shall govern.

7.4 Acid Test:

7.4.1 Apply a mixture of 50 parts beeswax and 50 parts paraffin to protect the raw edges to a distance of 10 mm (¾ in.)

7.4.2 Immerse the panels in the acid bath (5.1) at $21 \pm 2^\circ\text{C}$ ($70 \pm 3.5^\circ\text{F}$) for 6 h. Remove the panels, rinse in water, and allow to dry.

7.4.3 Examine and evaluate as in 7.3.4.

8. Precision and Bias

8.1 No information is presented about either the precision or bias of this test method, since the test results are nonquantitative.

9. Keywords

9.1 acid resistance; differentiation of coatings; extruded aluminum parts; mortar resistance; uniform continuous film

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