
This standard is issued under the fixed designation E 1795; 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 reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers minimum material performance requirements and laboratory test procedures for non-reinforced liquid coating encapsulation products (single or multiple-coat systems) for leaded paint in buildings. Performance properties addressed in this specification are:

1.1.1 Impact resistance,
1.1.2 Adhesion,
1.1.3 Dry Abrasion Resistance,
1.1.4 Water Vapor Transmission,
1.1.5 Water and Chemical Resistance,
1.1.6 Surface Burning Characteristics,
1.1.7 Volatile Organic Compound (VOC) Content,
1.1.8 Weathering,
1.1.9 Aging,
1.1.10 Scrub Resistance,
1.1.11 Mildew Resistance,
1.1.12 Paintability/Repairability,
1.1.13 Flexibility, and
1.1.14 Tensile Properties.

1.2 This specification does not address the selection of an encapsulation product for specific use conditions. Specific use conditions may require performance values other than those stated in this specification. See Guide E 1796.

1.3 This specification complements Specification E 1797 for reinforced liquid coating encapsulation products.

1.4 This specification does not cover the use of encapsulation products on industrial steel structures nor on residential coated metal surfaces because no corrosion control requirements are included.

1.5 This specification applies to any non-reinforced liquid applied product that relies primarily on adhesion for attachment to the surface. These products are used to encapsulate a leaded paint surface with the intent of reducing human exposure to lead.

1.6 The results of the test methods included in this specification will not necessarily predict field performance.

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

1.8 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 requirements prior to use.

2. Referenced Documents

2.1 ASTM Standards:
D 16 Terminology for Paint and Related Coatings, Materials, and Applications
D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels
D 1005 Test Methods for Measurement of Dry-Film Thickness of Nonmagnetic Coatings Applied to a Ferrous Base
D 1212 Test Methods for Measurement of Wet Film Thickness of Organic Coatings
D 1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
D 1475 Test Method for Density of Paint, Varnish, Lacquer, and Related Products
D 1653 Test Methods for Water Vapor Transmission of Organic Coating Films
D 2370 Test Method for Tensile Properties of Organic Coatings
D 2486 Test Method for Scrub Resistance of Wall Paints
D 2794 Test Method for Resistance of Organic Coatings to Effects of Rapid Deformation (Impact)
D 3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
D 3274 Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation
D 3359 Test Methods for Measuring Adhesion by Tape Test
D 3891 Practice for Preparation of Glass Panels for Testing Paint, Varnish, Lacquer, and Related Products
D 3924 Specification for Standard Environment for Conditioning and Testing Paint, Varnish, Lacquers and Related Materials
D 3925 Test Methods for Sampling Liquid Paints and Related Pigmented Coatings
D 3960 Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
D 4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films
D 4414 Practice for Measurement of Wet Film Thickness by Notch Gages
D 4708 Practice for Preparation of Uniform Free Films of Organic Coatings
E 84 Test Method for Surface Burning Characteristics of Building Materials
E 1605 Terminology Relating to Lead in Buildings
E 1796 Guide for Selection and Use of Liquid Coating Encapsulation Products for Lead Paint in Buildings
E 1797 Specification for Reinforced Liquid Coating Encapsulation Products for Lead Paint in Buildings
E 2239 Practice for Record Keeping and Record Preservation for Lead Hazard Activities
G 154 Practice for Operating Fluorescent Light for UV Exposure of Nonmetallic Materials

2.2 Federal Test Methods Standard 141D:¹
2011 Preparation of Steel Panels
2012 Preparation of Tin Panels
3011 Condition in Container

3. Terminology
3.1 Definitions—For definitions of terms used in this specification, refer to Terminologies D 16 and E 1605.
3.2 Definition of Term Specific to This Standard
3.2.1 lead inaccessibility—the ability of an encapsulation product to resist or inhibit the transport of lead to its surface.

4. Classification
4.1 Type I: Interior Use Only—Type I defines encapsulation products intended for interior use. These products shall meet the requirements of this specification except those for weathering and exterior aging (that is, test methods described in 10.9 and 10.10.1 not conducted).
4.2 Type II: Exterior Use Only—Type II defines encapsulation products intended for exterior use. These products shall meet the requirements of this specification except that for interior aging (that is, test method described in 10.10.2 not conducted).

4.3 Type III: Either Exterior or Interior Use—Type III defines encapsulation products intended for either interior or exterior use. These products shall meet all the requirements of this specification.

5. Performance Requirements
5.1 Performance requirements that shall be met for a non-reinforced liquid coating encapsulation product are given in Table 1.

NOTE 1—In addition to those given in Table 1, performance requirements for three other properties are of concern for liquid coating encapsulation products. These are combustion toxicity, emissions during application and curing, and lead accessibility. However, requirements for these properties cannot be included in this specification at this time because there are no adequate ASTM or Federal test methods for determining them. Requirements for two of these properties, combustion toxicity and emissions during application and curing, may be subject to regulations or ordinances promulgated by authorities having jurisdiction. The user of this specification is advised to determine whether such regulations or ordinances exist. The addition of requirements for these properties to this specification will be undertaken when suitable test methods are available.

6. Sampling
6.1 A 3.8-L (1-gal) sample is usually sufficient for the recommended tests.
6.2 Prior to sampling, establish the condition of the container since damage to it may cause evaporation, skinning, or other undesirable effects. Excessive storage time and temperature fluctuations may cause settling or changes in viscosity. Materials beyond the manufacturer’s stated shelf life shall not be sampled.
6.3 Thickening, settling, and separation are undesirable and objectionable if the coating, after storage, cannot be readily made suitable for application with a reasonable amount of stirring. Determine the conditions in the container in accordance with Method 3011 of the Federal Test Method Standard No. 141C.
6.4 Sample the encapsulant in accordance with Practice D 3925. Determine the density in accordance with Test Method D 1475 and repeat until two successive readings agree within 90 g (0.2 lb). Samples for testing may then be taken.
6.5 Report the size of the container from which the sample was taken and product identification codes.

7. Number of Tests
7.1 The number of tests that shall be conducted for each performance property is given in Table 1.

8. Retesting
8.1 In cases where encapsulation products fail to pass one or more requirements of this specification, retesting shall be permitted. Both the original data and the retesting data for each requirement for which retesting was conducted shall be used in determining whether the requirement is met.

9. Test Specimens
9.1 A non-reinforced liquid coating encapsulation product shall be comprised of all principal components in the system, including the base and top coats and primer, if specified, for

¹ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.
TABLE 1 Performance Requirements for Reinforced Liquid Coating Encapsulation Products

<table>
<thead>
<tr>
<th>Performance Property</th>
<th>Minimum Performance Requirement</th>
<th>Tested in Accordance with Section</th>
<th>Minimum Number of Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact resistance</td>
<td>9 J (80 in-lbf) without cracking to the substrate</td>
<td>10.2</td>
<td>Two panels</td>
</tr>
<tr>
<td>Adhesion</td>
<td>5A rating</td>
<td>10.3</td>
<td>Two panels each tested at three locations</td>
</tr>
<tr>
<td>Dry abrasion resistance</td>
<td>Film thickness loss: &lt;20 %</td>
<td>10.4</td>
<td>Two panels</td>
</tr>
<tr>
<td>Water vapor transmission</td>
<td>No minimum; report test result(^a)</td>
<td>10.6</td>
<td>Three cups</td>
</tr>
<tr>
<td>Water and chemical resistance—spot test</td>
<td>After 1 h recovery period, no evidence of blistering, cracking, or delamination</td>
<td>10.6/10.6.1</td>
<td>Two tests for each reagent</td>
</tr>
<tr>
<td></td>
<td>After 24 h recovery, indistinguishable hardness of the exposed and unexposed surfaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water and chemical resistance—immersion test</td>
<td>Surface burning characteristics</td>
<td>After 2 h drying period, adhesion rating: 5A Flame spread index (FSI) &lt;25</td>
<td>10.6/10.6.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smoke development rating &lt;50</td>
<td>10.7</td>
</tr>
<tr>
<td>Volatile organic compound (VOC) content</td>
<td>No minimum; report test result(^b) After exposure:</td>
<td>10.8</td>
<td>See Practice D 3960</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.9</td>
<td>Chalking and Adhesion:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flexibility: three panels Tensile properties:</td>
<td>10.13.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>two panels each tested at three locations</td>
<td>Flexibility: three panels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tensile properties: ten specimens</td>
<td>10.13</td>
</tr>
<tr>
<td>Aging—exterior and interior end-use products</td>
<td>After minimum 6 h recovery:</td>
<td>10.10.1 for exterior products</td>
<td>Adhesion: two panels each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.10.2 for interior products</td>
<td>Flexibility: three panels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tensile properties: ten specimens</td>
<td>10.6</td>
</tr>
<tr>
<td>Scrub resistance</td>
<td>No erosion of the encapsulant to the substrate after 1200 cycles</td>
<td>10.11</td>
<td>Two panels</td>
</tr>
<tr>
<td>Mildew resistance</td>
<td>Mildew resistance rating: 8</td>
<td>10.12</td>
<td>Three panels</td>
</tr>
<tr>
<td>Paintability</td>
<td>Adhesion rating: 5A</td>
<td>10.13.1</td>
<td>Two panels each tested at three locations</td>
</tr>
<tr>
<td>Repairability</td>
<td>Adhesion rating: 5A</td>
<td>10.13.2</td>
<td>Two panels each tested at three locations</td>
</tr>
<tr>
<td>Flexibility</td>
<td>No cracking or other visual defects</td>
<td>10.14</td>
<td>Three panels</td>
</tr>
<tr>
<td>Tensile Properties</td>
<td>No minimum; report test result(^c)</td>
<td>10.15</td>
<td>Ten specimens</td>
</tr>
</tbody>
</table>

\(^a\) Minimum performance depends on architectural and end use conditions (see 1.2).
\(^b\) VOC requirements may be specified in ordinances promulgated by authorities having jurisdiction.
\(^c\) The chalking and adhesion tests can be conducted on the same panels provided that chalking is first performed.

9.2 Preparation of Test Panels:

9.2.1 The test specimen (substrate) shall be the encapsulant coated test panel.

9.2.2 Prior to product application, the tin-plated steel panels shall be solvent cleaned in accordance with Method 2012 of the Federal Test Method Standard No. 141C. Supplement the test panel cleaning procedure with an additional cleaning so that water wets the entire surface of the panel. Dry and wipe clean.

9.2.3 Product application shall be performed using the draw-down procedure in accordance with Practice D 823. Determine dry-film thickness in accordance with Test Method D 1005 for free films and Test Methods D 1186 for films on steel panels except when the manufacturer’s written instructions reference only wet-film thickness. In this case, determine wet-film thickness in accordance with Test Methods D 1212 or Practice D 4414. If a range of thickness is specified by the manufacturer for field application, the minimum value of this range shall be used for product testing in accordance with this specification. Dry-film thickness shall remain constant for all tests.

9.2.4 Preparation of steel panels shall be in accordance with Method 2011 of Federal Test Method Standard No. 141C.

9.2.5 Preparation of glass panels shall be in accordance with Practice D 3891.

9.2.6 Curing shall be performed under standard laboratory conditions in accordance with Specification D 3924. Cure time shall be 7 days unless otherwise agreed upon between the purchaser and seller. Cure time shall remain constant for all tests.

9.3 Preparation of Free-Film Specimens:

9.3.1 Free-film specimens shall be prepared in accordance with Practice D 4708.

9.4 Laboratory Conditions:

9.4.1 Where applicable, all test methods and practices included in this specification shall be performed under standard laboratory conditions in accordance with Specification D 3924. ASTM standard conditions for laboratory testing are 23 ± 2°C (73.5 ± 3.5°F) and 50 ± 5% relative humidity.

10. Test Methods

10.1 The laboratory testing shall be performed on the entire non-reinforced liquid coating encapsulation product system, whether single or multiple coat, as applied in the field.

10.2 Impact Resistance—Determine impact resistance in accordance with Test Method D 2794 using 0.80 mm (0.032 in.) zinc phosphate treated, cold-rolled steel panels as substrate and 16 mm (5/8 in.) punch diameter. The impact shall be applied...
directly to the encapsulant coating. After impact, examine the encapsulant coating visually for the presence of cracks using 5 to 7X magnification.

10.3 Adhesion—Determine the degree of adhesion in accordance with Test Method D 3359, Method A, using 0.25 mm (0.010 in.) tin plated steel panels as substrate.

10.4 Dry Abrasion Resistance—Determine dry abrasion resistance in accordance with Test Method D 4060 using CS-17 wheels, a 1 kg mass, and 0.80-mm (0.032-in.) cold-rolled steel panels as substrate. Where applicable, it is not prohibited to use specialty primers on the steel panel for flash rust resistance, although such primers may not be a component of the encapsulant product system. If used, subtract the thickness of the primer coat from the total film thickness of the test panel when calculating the percent film-thickness loss occurring during abrasion. Conduct the abrasion for 1000 cycles. Before initiating abrasion, draw diagonal lines with a marking pen from corner to corner across the test panel to measure film loss initiating abrasion. Conduct the abrasion for 1000 cycles. Before

10.5 Water Vapor Transmission—Determine the water vapor transmission in accordance with Test Method D 1653, Method A (Dry Cup Method), Condition A. Test the encapsulant product as a free film that has a thickness specified by the manufacturer for product application.

10.6 Water and Chemical Resistance—Determine the resistance to water and chemicals in accordance with Test Method D 1308, using 0.25-mm (0.010-in.) tin-plated steel panels as the substrates for the immersion test and glass panels as the substrates for the spot tests.

10.6.1 Spot Test—Conduct the spot test using the reagents listed in 10.6.1.1 through 10.6.1.9. For each reagent, add 3 mL to a cotton ball placed on the coated glass panel. Cover the cotton ball with a watch glass or other suitable device. Remove the cotton ball after 24 h and gently pat the specimen dry with a paper towel. Then allow the specimen to recover for at least 6 h. Then, determine the degree of adhesion in accordance with 10.3. Test flexibility in accordance with 10.14. Evaluate tensile properties in accordance with 10.15.

10.10 Aging—There is no applicable ASTM or federal test method for measuring aging for encapsulation products; however, the following aging exposures shall be performed.

10.10.1 Exterior Products—Expose panels coated with exterior use products to twelve cycles (three cycles shall be performed on one day, resulting in a four-day test) with each cycle involving the following time/temperature changes: 50 ± 2°C (120 ± 5°F) for 1 h, room temperature for 15 min, −15°C (0°F) for 1 h, and room temperature for 15 min. Store panels at −15°C (0°F) overnight. After exposure, allow the specimens to recover for at least 6 h. Then, determine the degree of adhesion in accordance with 10.3. Test flexibility in accordance with 10.14. Evaluate tensile properties in accordance with 10.15.

10.10.2 Interior Products—Exposure of panels coated with interior use products to 40°C for a period of 2 weeks. After exposure, allow the panels to recover at least 6 h. Then, determine the degree of adhesion in accordance with 10.3. Test flexibility in accordance with 10.14. Evaluate tensile properties in accordance with 10.15.

10.6.1.8 Trisodium Phosphate, (5 %/95 % trisodium phosphate/water by mass).
10.6.1.9 Distilled Water.

10.6.2 Immersion Test—Conduct the immersion test by immersing one half of the panel in distilled water for 24 h at standard laboratory conditions. Protect the backs, sides, and edges of the panel against rusting. After removal from the water, allow the panel to dry for 2 h at standard laboratory conditions before testing for adhesion in accordance with 10.3.

10.7 Surface Burning Characteristics—Determine surface burning characteristics in accordance with Test Method E 84 using Sterling Board or equivalent as substrate.

10.8 Volatile Organic Compound (VOC) Content—Determine VOC content in accordance with Practice D 3960.

10.9 Weathering—For non-reinforced liquid coating encapsulation products designated for exterior use, determine the degree of weathering in accordance with Practice G 154. Conduct practice for 1000 h under fluorescent lamps with a peak emission at 313 nm and a time/temperature cycle of 4 h ultraviolet (UV) at 60°C and 4 h condensation at 50°C. After exposure, evaluate the degree of chalking in accordance with Test Method D 4214, Method A, using wool felt of a contrasting color. Determine the degree of adhesion in accordance with 10.3. Test flexibility in accordance with 10.14. Evaluate tensile properties in accordance with 10.15.

10.10 Scrub Resistance—Determine scrub resistance in accordance with Test Method D 2486, Method A.

10.11 Mildew Resistance—Determine resistance to mildew in accordance with Test Method D 3273. Determine rating in accordance with Test Method D 3274.

10.13 Paintability/Repairability—There are no applicable ASTM or federal test methods to measure these properties; however, the following two procedures shall be performed.
a coat of a commercially available acrylic latex paint in accordance with the paint manufacturer’s specification for film thickness. After the cure time specified for the latex paint has elapsed, determine the degree of adhesion between the encapsulant and the latex paint in accordance with 10.3.

10.13.2 Repairability—Apply the encapsulation product to a 0.25-mm (0.010-in.) tin plated steel panel. After curing, apply another coat of encapsulant to the panel. Apply both coats in accordance with the encapsulants manufacturer’s specification for film thickness. After the cure time for the encapsulant has elapsed, determine the degree of adhesion between the two coats of encapsulant in accordance with 10.3.

**NOTE 3**—Coats of different colors applied to the test panel may aid in the identification of visual defects in the coated surface after performance of the adhesion test.

10.14 Flexibility—Determine flexibility in accordance with Test Method D 522, Method A, using a conical mandrel and 0.25-mm (0.010-in.) tin plated steel panel as substrate. After a 1-s bend, examine the encapsulant at a distance of 6.4 mm (¼ in.) from the 3.2-mm (⅛-in.) end of the conical mandrel for the presence of cracking and other defects.

10.15 Tensile Properties—Determine tensile properties in accordance with Test Method D 2370. Test shall be performed on free film, not less than 0.075 mm (0.003 in.) thick. Specimens shall be 100 mm (4 in.) in length and 13 mm (0.5 in.) in width. Use a gage length of 50 mm (2 in.) and a crosshead speed of 10 ± 1 mm/min (0.5 ± 0.05 in./min). Determine percent elongation at 700 kPa (100 psi).

11. Record Keeping

11.1 All supporting data and reports of tests conducted shall be kept by the encapsulant supplier in accordance with Practice E 2239.

12. Report

12.1 The report shall include the following:

12.1.1 The name, address, phone number, and e-mail address of the laboratory performing the tests as well as the name of the quality assurance supervisor responsible for the testing,

12.1.2 A brief description of the encapsulation product tested including the use of any primers, base and topcoats, application instructions, and substrates used for preparing test panels,

12.1.3 Dry film thickness of the cured encapsulation product,

12.1.4 Cure conditions including time, temperature, and relative humidity,

12.1.5 Product identification codes,

12.1.6 Description of the acrylic latex paint (used in the paintability test, 10.13.1) including brand name and the manufacturer’s product code,

12.1.7 Test specimen identification codes, and

12.1.8 The average results of all of the performance tests conducted in accordance with this specification.

13. Marking

13.1 Containers shall be marked, at a minimum, with the following information:

13.1.1 Usable shelf life and proper storage conditions, and

13.1.2 ASTM classification type (see Section 4).

14. Keywords

14.1 abatement; encapsulant; encapsulation; lead; leaded paint; liquid coating; liquid coating encapsulation product; non-reinforced liquid coating encapsulation product

APPENDIX

(Nonmandatory Information)

X1. ALPHABETICAL LIST OF TEST METHODS AND PRACTICES

X1.1 This appendix presents a summary table of the ASTM test methods and practices, and also federal test method standards included in the specification.
### Table X1.1 Alphabetical List of Test Methods and Practices

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<th>Section</th>
<th>ASTM Test Method or Practice</th>
<th>Federal Test Method Std. No.</th>
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<td>10.3</td>
<td>D 3359</td>
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<tr>
<td>Aging</td>
<td>10.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chalking</td>
<td>10.9</td>
<td>D 4214</td>
<td></td>
</tr>
<tr>
<td>Condition in container</td>
<td>6.3</td>
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<td></td>
</tr>
<tr>
<td>Density</td>
<td>6.4</td>
<td>D 1475</td>
<td></td>
</tr>
<tr>
<td>Dry abrasion resistance</td>
<td>10.4</td>
<td>D 4060</td>
<td></td>
</tr>
<tr>
<td>Dry-film thickness</td>
<td>9.2.3</td>
<td>D 1005, D 1186</td>
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</tr>
<tr>
<td>Film application on test panels</td>
<td>9.2.3</td>
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</tr>
<tr>
<td>Flexibility</td>
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<td></td>
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<td>9.3.1</td>
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</tr>
<tr>
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<td>10.2</td>
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<td>Scrub resistance</td>
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</tr>
<tr>
<td>Standard laboratory conditions</td>
<td>9.4.1</td>
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<td></td>
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<tr>
<td>Steel panel preparation</td>
<td>9.2.4</td>
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<td>2011</td>
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<td>Surface burning characteristics</td>
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<td>10.8</td>
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<td>Water and chemical resistance</td>
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<td></td>
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<tr>
<td>Wet-film thickness</td>
<td>9.2.3</td>
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<td></td>
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