



Standard Specification for Non-Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings¹

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. ~~The test methods and practices included are listed in Table 1. Specifications for reinforced liquid coating encapsulation products are provided in Specification E 1797. 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.

1.45 This specification applies to any non-reinforced liquid applied product, designed to reduce human exposure to lead in paints, which product that relies primarily on adhesion for attachment to the surface.

1.5 The laboratory testing specified in this specification shall be performed on surface. These products are used to encapsulate a leaded paint surface with the entire non-reinforced liquid coating encapsulation product system, whether single or multiple coat, as applied in the field. A non-reinforced liquid coating encapsulation product shall be comprised intent of all principal components in reducing human exposure to lead.

1.6 The results of the system, including the base and top coats and primer, if specified, for field application. Except for dry abrasion testing, where specialty primers maybe used for flash rust resistance, primers shall not be used solely for product performance testing test methods included in accordance with this specification will not necessarily predict field performance.

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

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

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 limitations requirements prior to use.*

¹ This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.23 on Lead Paint Abatement—Hazards Associated with Buildings.

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2. Referenced Documents ²

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 Organic Coatings Using Micrometers
- D 1186 Test Methods for Nondestructive 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 3924 Specification 3891 Practice for Standard Environment Preparation of Glass Panels for Conditioning and Testing Paint, Varnish, Lacquers, and Related Materials² Products~~
- ~~D 3960 Practice 3924 Specification for Determining Volatile Organic Compound (VOC) Content of Paints Standard Environment for Conditioning and Testing Paint, Varnish, Lacquers and Related Coatings² Materials~~
- ~~D 4060/3925 Test Methods for Abrasion Resistance of Organic Coatings by the Taber Abraser² Sampling Liquid Paints and Related Pigmented Coatings~~
- ~~D 4214 Test Methods 3960 Practice for Evaluating Degree Determining Volatile Organic Compound (VOC) Content of Chalking of Exterior Paint Films² Paints and Related Coatings~~
- ~~D 4414 Practice 4060 Test Method for Measurement Abrasion Resistance of Wet Film Thickness Organic Coatings by Notched Gages² the Taber Abraser~~
- ~~D 4708 Practice 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 300 Practice for Sampling Industrial Chemicals 1605 Terminology Relating to Lead in Buildings~~
- ~~E 1605 Terminology Relating to Abatement 1796 Guide for Selection and Use of Hazards from Lead-Based Liquid Coating Encapsulation Products for Leaded Paint in Buildings and Related Structures Buildings~~
- ~~E 1796 Guide 1797 Specification for Selection and Use of Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings~~
- ~~E 1797 Specification 2239 Practice for Reinforced Liquid Coating Encapsulation Products Record Keeping and Record Preservation for Leaded Paint in Buildings⁶ Lead Hazard Activities~~
- G 1534 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) Fluorescent Light for UV Exposure of Nonmetallic Materials
- 2.2 *Federal Test Methods Standard 141ED:*³
 - 2011 Preparation of Steel Panels
 - 2012 Preparation of Tin Panels
 - ~~2021 Glass Panel Preparation~~
 - 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 *Definitions of Terms 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 all

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards*, Vol 06.01, volume information, refer to the standard's Document Summary page on the ASTM website.

Annual Book of ASTM Standards, Vol 06.02.

³ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

the requirements of this specification except those of 5.9 for weathering and 5 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 all the requirements of this specification except that for interior aging (that is, test method 5d 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 *Impact Resistance*—Minimum performance is 9-J (80-in.-lb) direct impact (that is, coating side up) without cracking to substrate, determined by visual observation using 5× magnification and in accordance with 10.1.

5.2 *Adhesion*—Minimum performance is a 5A rating when determined in accordance with 10.2.

5.3 *Dry Abrasion Resistance*—Minimum performance is no greater than a 20% loss in film thickness after 1 000 cycles when determined in accordance with 10.3.

5.4 *Water Vapor Transmission*—Test results

5.1 Performance requirements that shall be met for a non-reinforced liquid coating encapsulation product are given in accordance with 10.4. Table 1.

NOTE 1—Minimum performance depends on architectural and use conditions. (See 1.2.)

5.5 *Flexibility*—Minimum performance is absence of cracking and other visual defects measured at 6.4 mm (0.25 in.) from the 3.2-mm (0.125-in.) end of the conical mandrel after a 1-s bend and determined in accordance with 10.5.

5.6 *Water and Chemical Resistance*—

5.6.1 *Spot Test*—For the 24-h covered spot test, determined in accordance with 10.6.1, after a recovery period of 1 h, minimum performance is no evidence of blistering, wrinkling, cracking, or delamination. After a recovery period of 24 h, minimum performance is no distinguishable difference in the hardness between the area exposed 1—In addition to the reagent and adjacent unexposed area when rubbed lightly with a tongue depressor.

5.6.2 *Immersion Test*—For the 24-h distilled water immersion test, minimum performance for adhesion is a 5A rating determined those given in accordance with 10.2. After a recovery period of 24 h, the portions of the panel that were and were not immersed should be indistinguishable with respect to hardness when rubbed lightly with a tongue depressor.

5.7 *Surface Burning Characteristics*—Minimum Table 1, performance is a flame spread index (FSI) of less than 25 and a smoke development rating of less than 50 determined in accordance with 10.7.

5.8 *Volatile Organic Compound (VOC) Content*—Test results shall be reported in accordance with 10.8.

NOTE 2—Volatile organic compound requirements may be specified by Federal, State, and local regulatory agencies and ordinances.

5.9 *Weathering*—For non-reinforced liquid coating encapsulation products designated for exterior use, resistance to weathering is determined in accordance with 10.9. Minimum performance is an 8 rating for chalking. Minimum performance for adhesion and flexibility is absence of cracking and three other visual deterioration measured at 6.4 mm (0.25 in.) from the 3.2-mm (0.125-in.) end of the conical mandrel after a 1-s bend. Minimum performance for elongation is no more than 35% relative change from the ultimate value obtained when unexposed panels are tested.

5.10 *Aging*—Minimum performance for adhesion and flexibility is absence of cracking and other visual deterioration measured at 6.4 mm (0.25 in.) from the 3.2-mm (0.125-in.) end of the conical mandrel after a 1-s bend. Minimum performance for elongation is no more than 35% relative change from the ultimate value obtained when unexposed panels are tested.

5.10.1 *Exterior Products*—For exterior end-use products, effects of aging are determined in accordance with 10.10.1. (See 5.9 for minimum performance requirements.)

5.10.2 *Interior Products*—For interior end-use products, effects of aging are determined in accordance with 10.10.2. (See 5.9 for minimum performance requirements.)

5.11 *Scrub Resistance*—Minimum performance is the absence of failure to substrate (that is, erosion of coating) after 1200 cycles when determined in accordance with 10.11.

5.12 *Mildew Resistance*—Minimum performance is an 8 rating when determined in accordance with 10.12.

5.13 *Paintability/Repairability*—

5.13.1 Minimum performance for adhesion is a 5A rating when determined in accordance with 10.13.1.

5.13.2 Minimum performance for adhesion is a 5A rating when determined in accordance with 10.13.2.

5.14 *Tensile Properties*—Minimum performance depends on specific use conditions. However, the test results shall be reported in accordance with 10.14.

NOTE 3—Three additional properties are of concern for non-reinforced liquid coating encapsulation products. These are combustion toxicity, emissions during application and curing, and lead-in 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 Federal, State and local 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.

TABLE 1 Performance Requirements for Reinforced Liquid Coatings Method Encapsulation Products

Test Method Property	Minimum Performance Requirement	ASTM Test Method in Accordance with Section	Federal Test Method No. 144G Tests
Adhesion	10.2	D 3359	
Adhesion	Impact resistance	9 J (80 in-lbf) without cracking to the substrate	
Chalking	10.9	D 4214	
Chalking	10.2	D 4214	Two panels
Condition in container	6.2		3011
Condition in container	Adhesion	5A rating	3011
Density or weight per gallon	6.3	D 1475	
Density or weight per gallon	10.3	D 1475	Two panels each tested at three locations
Dry abrasion resistance	10.3	D 4060	
Dry abrasion resistance	Film thickness loss: <20 %	10.4	
Dry film thickness	7.1.3	D 4005, D 4186	
Dry film thickness	7.1.3	D 4005, D 4186	Two panels
Film application on test panels	7.1.3	D 823	
Film application on test panels	Water vapor transmission	No minimum; report test result ^A	
Flexibility	10.5	D 522	
Flexibility	10.5	D 522	Three cups
Free film preparation	7.2.1	D 4708	
Free film preparation	Water and chemical resistance—spot test	After 1 h recovery period, no evidence of blistering, cracking, or delamination	
Glass panel preparation	9.1.5	2021	
Glass panel preparation	10.6/10.6.1	Two tests for each reagent	
Impact resistance	10.1	D 2794	
Impact resistance		After 24 h recovery, indistinguishable hardness of the exposed and unexposed surfaces	
Mildew resistance	10.12	D 3273, D 3274	
Paintability	10.13	D 3359 (modified)	
Sampling	6.3	E 300	
Water and chemical resistance—immersion test	After 2 h drying period, adhesion rating: 5A	10.6/10.6.2	Two panels each tested at three locations
Scrubbability	10.14	D 2486	
Surface burning characteristics	Flame spread index (FSI) <25 Smoke development rating <50	10.7	One panel
Standard laboratory conditions	7.1.4	D 3924	
Volatile organic compound (VOC) content	No minimum; report test result ^B	10.8	See Practice D 3960
Steel panel preparation	7.1.2		2011
Weathering—exterior end-use products	After exposure: chalking: 8 rating adhesion: 5A rating flexibility: no cracking or other visual defects tensile properties: <35 % change from initial value	10.9	Chalking and Adhesion: two panels each tested at three locations ^C Flexibility: three panels Tensile properties: ten specimens
Surface burning characteristics	10.7	E 84	
Aging—exterior and interior end-use products	After minimum 6 h recovery: adhesion: 5A rating flexibility: no cracking or other visual defects tensile properties: <35 % change from initial value	10.10.1: for exterior products 10.10.2: for interior products	Adhesion: two panels each tested at three locations Flexibility: three panels Tensile properties: ten specimens
Tensile properties	10.14	D 2370	
Scrub resistance	No erosion of the encapsulant to the substrate after 1200 cycles	10.11	Two panels
Tin panel preparation	7.1.2		2012
Mildew resistance	Mildew resistance rating: 8	10.12	Three panels
VOC content	10.8	D 3960	
Paintability	Adhesion rating: 5A	10.13.1	Two panels each tested at three locations
Water and chemical resistance	10.6	D 4308	
Repairability	Adhesion rating: 5A	10.13.2	Two panels each tested at three locations
Water vapor transmission	10.4	D 1653	
Flexibility	No cracking or other visual defects	10.14	Three panels
Weathering/aging	10.9, 10.10	G 53	
Tensile Properties	No minimum; report test result ^A	10.15	Ten specimens

^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.

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.

6.2.3 Thickening, settling, and separation are undesirable and objectionable if a the coating, after storage, cannot be readily

~~reconditioned and made suitable for application with a reasonable amount of stirring. The referenced method covers procedures for determining changes in properties after storage. Determine the conditions in the container in accordance with Method 3011 of the Federal Test Method Standard No. 141C.~~

~~6.34 Sample the encapsulant in accordance with Practice E 300, 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.~~

~~6.45 Report the size of the container from which the sample was taken and product identification codes. A 3.8-L (1-gal) sample is usually sufficient for the recommended tests. codes.~~

7. Number of Tests

~~7.1 Impact Resistance—A minimum~~

~~7.1 The number of two panels shall be tested in accordance with 10.1.~~

~~7.2 Adhesion—A minimum of three locations each on two panels shall be tested in accordance with 10.2.~~

~~7.3 Dry Abrasion Resistance—A minimum of two panels shall be tested in accordance with 10.3.~~

~~7.4 Water Vapor Transmission—A minimum of three cups shall be tested in accordance with 10.4.~~

~~7.5 Flexibility—A minimum of three panels shall be tested in accordance with 10.5.~~

~~7.6 Water and Chemical Resistance:~~

~~7.6.1 Spot Test—For the 24-h covered spot test, a minimum of two tests for each reagent that shall be performed in accordance with 10.6.1.~~

~~7.6.2 Immersion Test—For the 24-h distilled water immersion test, a minimum of three sets of locations on one panel shall be tested in accordance with 10.6.2.~~

~~7.7 Surface Burning Characteristics—A minimum of one panel shall be tested in accordance with 10.7.~~

~~7.8 Volatile Organic Compound (VOC) Content—Testing shall be performed in accordance with 10.8.~~

~~7.9 Weathering—A minimum of three locations each on two panels shall be tested conducted for adhesion in accordance with 10.2 and chalking in accordance with 10.9. A minimum of three panels shall be tested for flexibility in accordance with 10.5. A minimum of ten specimens shall be tested for tensile properties in accordance with 10.14.~~

~~7.10 Aging—After aging, a minimum of three locations each on two panels shall be tested for adhesion performance property is given in accordance with 10.2. A minimum of three panels shall be tested for flexibility in accordance with 10.5. A minimum of ten specimens shall be tested for tensile properties in accordance with 10.14.~~

~~7.11 Scrub Resistance—A minimum of two panels shall be tested in accordance with 10.11.~~

~~7.12 Mildew Resistance—A minimum of three panels shall be tested in accordance with 10.12.~~

~~7.13 Paintability/Repairability:~~

~~7.13.1 A minimum of two panels with three locations per panel shall be tested in accordance with 10.13.1.~~

~~7.13.2 A minimum of two panels with three locations per panel shall be tested in accordance with 10.13.2.~~

~~7.14 Tensile Properties—A minimum of ten specimens shall be tested in accordance with 10.14. Table 1.~~

8. Retesting

~~8.1 If any failure occurs, the material may be retested~~

~~8.1 In cases where encapsulation products fail to establish conformity in accordance with agreement between the purchaser and the seller. Conditions pass one or more requirements of this specification, retesting shall be identical to those specified permitted. Both the original data and the retesting data for initial testing. If application or curing conditions have changed, all properties each requirement for which retesting was conducted shall be assessed under used in determining whether the changed conditions to ensure conformity. 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 field application. Except for adhesion testing and dry abrasion testing, where specialty primers may be used for flash rust resistance, primers shall not be used solely for product performance testing in accordance with this specification.~~

~~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 thicknesses 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.~~

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

9.1.2.5 Preparation of glass panels shall be in accordance with Method 2021 of Federal Test Method Standard No. 141C.

9.1.6 Curing 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.

~~9.2 Preparation of Free-Film Specimens :~~

~~9.2.1 Free film specimens shall be prepared in accordance with Practice D 4708.~~

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 $23 \pm 2^\circ\text{C}$ ($73.5 \pm 3.5^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

10. Test Methods

~~10.1 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~~

10.1 The laboratory testing shall be performed on the entire non-reinforced liquid coating encapsulation product system, whether single or multiple coat, as substrate and 16 mm (0.625 in.) punch diameter, 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 7 \times 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.~~

~~10.3 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, specialty primers used only for flash rust resistance and not as a component of the product system may be used. If used, subtract the thickness of the primer coat from the total film thickness used in the performance calculation. To more accurately measure film loss, draw diagonal lines with a marking pen from corner to corner across the test panel. Measure initial and final film thickness in an area approximately 30 mm (1.25 in.) from all four corners.~~

~~10.4 Water Vapor Transmission Dry Abrasion Resistance—Determine the water vapor transmission dry abrasion resistance in accordance with Test Method D 1653, Method A (Dry Cup Method), Condition A. Test 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 consistently. Measure initial and final film thickness of 0.075 on four abrasion locations on the encapsulant surface according to Method D 1186 using an electronic thickness gage. Select these four locations along the diagonal lines approximately 30 mm (0.003 in.) (1.25 in.) from all four corners of the test panel.~~

~~10.5 Flexibility Water Vapor Transmission—Determine the degree of flexibility water vapor transmission in accordance with Test Methods D 522, Method A, using a conical mandrel and 0.25-mm (0.010-in.) tin plated steel panels D 1653, Method A (Dry Cup Method), Condition A. Test the encapsulant product as substrate, 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 as follows on using the following reagents: 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. After 24 h, remove the cotton ball after 24 h and gently pat the specimen dry with a paper towel. After a 1-h recovery period, examine coating film with Then allow the specimen to recover for 1 h, and examine it by unaided eye for the presence evidence of blisters, wrinkling, blistering, cracking, or delamination. After a 24-h recovery period, evaluate for evidence of softening by lightly rubbing the affected reagent-exposed area and an adjacent unexposed area with a wood tongue depressor; judge whether the hardness of the exposed and unexposed areas can be subjectively distinguished.~~

~~10.6.1.1 Ethyl Alcohol₂ (50 %/50 % ethyl alcohol/water by volume).~~

~~10.6.1.2 Acetic Acid₂ (5 %/95 % glacial acetic acid/water by volume).~~

~~10.6.1.3 Sodium Hydroxide₂ (5 %/95 % sodium hydroxide/water by weight)-mass).~~

~~10.6.1.4 Hydrochloric Acid₂ (5 %/95 % hydrochloric acid (37 %)/water by volume).~~

10.6.1.5 *Citric Acid*₂ (5 %/95 % citric acid/water by ~~weight~~ mass).

10.6.1.6 *Corn Oil*.

10.6.1.7 *Phosphoric Acid*₂ (2 %/95 % phosphoric acid/water by volume).

10.6.1.8 *Trisodium Phosphate*₂ (5 %/95 % trisodium phosphate/water by ~~weight~~ 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 ~~Test Method D 3359, Method A, 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 1534. 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. ~~E 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 Method D 3359, Method A, (10.2) using 0.25-mm (0.010-in.) tin plated steel panels as substrate, test flexibility in accordance with Test Methods D 522, Method A, (10.5) using 0.25-mm (0.010-in.) tin plated steel panels as substrate. 10.14. Evaluate tensile properties in accordance with Test Method D 2370 (10.14). 10.15.~~

10.10 *Aging*—There is no applicable ASTM or ~~F~~ federal test method ~~t~~ for measuring aging for encapsulation products; however, the following test method, involving subjecting test panels to changes from high to low temperatures, 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 coatings the specimens to recover for at least 6 h and then h. Then, determine the degree of adhesion in accordance with 10.3. Test Method D 3359, Method A, (10.2) using 0.25-mm (0.010-in.) tin plated steel panels as substrate, and the flexibility in accordance with Test Method D 522, Method A, (10.5) using 0.25-mm (0.010-in.) tin plated steel panels as substrate. 10.14. Evaluate tensile properties in accordance with Test Method D 2370 (10.14). 10.15.

10.10.2 *Interior Products*—Expose the panels coated with interior use products to a regimen of 40°C for a period of 2 weeks. After exposure, allow the panels to recover at least 6 h and then h. Then, determine the degree of adhesion in accordance with 10.3. Test Method D 3359, Method A, (10.2) using 0.25-mm (0.010-in.) tin plated steel panels as substrate, and the flexibility in accordance with Test Method D 522, Method A, (10.5) using 0.25-mm (0.010-in.) tin plated steel panels as substrate. 10.14. Evaluate tensile properties in accordance with Test Method D 2370 (10.14). 10.15.

NOTE 42—If absence of color change after exposure to weathering/aging tests is desirable, conduct tests using an encapsulant product of the color to be used in the field. Evaluate and report visual color change. Minimum performance is agreed upon by the purchaser and the seller.

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

10.12 *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 ~~F~~ federal test methods to measure these properties; however, the following two test methods, modifications to the adhesion test, D 3359, Method A, procedures shall be performed.

10.13.1 *Paintability*—Apply the encapsulation product to a 0.25-mm (0.010-in.) tin plated steel panel. After curing, apply a coat of a commercially available acrylic latex paint in accordance with the paint manufacturer's specification for film thickness and, after the cure time. Determine time specified for the latex paint has elapsed, determine the degree of adhesion between the encapsulant and the latex paint in accordance with Test Method D 3359, Method A. 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 and cure. Apply both coats in accordance with thickness. After the manufacturer's specifications cure time for dry-film thickness. Determine the encapsulant has elapsed, determine the degree of adhesion between the two coats of the encapsulant in accordance with Test Method D 3359, Method A. 10.3.

NOTE 53—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. Report

~~11.1 The test report shall include a brief description of the system tested, including use of any primers, base coats~~Record Keeping

~~11.1 All supporting data and top coats, application instructions, curing conditions, and substrates used. Report dry-film thickness and dry/cure time. Report the size reports of the container from which the sample was taken and product identification codes. Report the type of latex paint used in the paintability test (10.13). The average value and all individual test results for all performance properties listed in this specification tests conducted shall be kept by the encapsulant supplier in accordance with Practiced 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

124.1 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

Test Method	Section	ASTM Test Method or Practice	Federal Test Method Std. No. 141C
Adhesion	10.3	D 3359	
Aging	10.10		
Chalking	10.9	D 4214	
Condition in container	6.3		3011
Density	6.4	D 1475	
Dry abrasion resistance	10.4	D 4060	
Dry-film thickness	9.2.3	D 1005, D 1186	
Film application on test panels	9.2.3	D 823	
Flexibility	10.14	D 522	
Free film preparation	9.3.1	D 4708	
Glass panel preparation	9.2.5	D 3891	
Impact resistance	10.2	D 2794	
Mildew resistance	10.12	D 3273, D 3274	
Paintability	10.13.1	D 3359	
Sampling	6.4	D 3925	
Scrub resistance	10.11	D 2486	
Standard laboratory conditions	9.4.1	D 3924	
Steel panel preparation	9.2.4		2011
Surface burning characteristics	10.7	E 84	
Tensile properties	10.15	D 2370	
Tin panel preparation	9.2.2		2012
VOC content	10.8	D 3960	
Water and chemical resistance	10.6	D 1308	
Water vapor transmission	10.5	D 1653	
Weathering	10.9	G 154	
Wet-film thickness	9.2.3	D 1212, D 4414	

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