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Standard Guide for Selection and Use of Liquid Coating Encapsulation Products for Leaded Paint in Buildings¹

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1. Scope

1.1 This guide is intended to provide building users such as commercial and private building owners, contractors, architects, homeowners and regulatory authorities with assistance in selecting an appropriate liquid coating encapsulation product for normal use situations for abating leaded paint. This guide also provides information that can be used to assist in the following: (1) determining whether a painted surface is suitable for encapsulation, (2) applying a liquid coating encapsulation product, (3) evaluating installed liquid coating encapsulation products, and (4) maintaining the encapsulated surface.

1.2 This guide applies to any liquid-applied product that relies primarily on adhesion for attachment to the surface and is designed to reduce human exposure to lead in paint.

1.3 This guide is not intended for use as a training manual. The information contained herein is not all-inclusive and does not provide comprehensive instructions for the selection, application, or maintenance of specific liquid coating encapsulation products. This guide is intended to supplement information supplied by encapsulation product manufacturers and safety requirements established by law. The user of this guide shall refer to the encapsulation product manufacturer's instructions for encapsulation product application and maintenance.

1.4 This guide does not cover minimum material performance requirements for liquid coating encapsulation products. Performance specifications for non-reinforced liquid coating encapsulation products are provided in Specification E 1795. Performance specifications for reinforced liquid coating encapsulation products are provided in Specification E 1797.

1.5 Encapsulation products for use on industrial steel structures are not covered in this guide. Industrial steel structures include, but are not limited to, bridges, water towers, and tanks.

1.6 Limited documentation is available on evaluating the field performance of liquid coating encapsulation products. A conservative approach to assessing the selection and use of liquid coating encapsulation products is thus adopted in this guide. As appropriate, the guidance provided within will be revised as additional knowledge regarding how these products perform over time is gained.

1.7 The user of this guide should follow all applicable state and local regulations regarding the use of encapsulation products.

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

1.9 *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:

D 16 Terminology Relating to Paint, Varnish, Lacquer, and Related Products²

D 1005 Test Methods for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers²

D 1212 Test Methods for Measurement of Wet Film Thickness of Organic Coatings²

D 3359 Test Methods for Measuring Adhesion by Tape Test²

D 4214 Test Methods for Evaluating Degree of Chalking of Exterior Paint Films²

D 5064 Practice for Conducting a Patch Test to Assess Coating Compatibility³

E 1605 Terminology Relating to Abatement of Hazards from Lead-Based Paint in Buildings and Related Structures⁴

E 1795 Specification for Non-Reinforced Liquid Coating Encapsulation Products for Paint in Buildings⁴

E 1797 Specification for Reinforced Liquid Coating Encapsulation Products for Leaded Paint in Buildings⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this guide, refer to Terminologies D 16 and E 1605.

3.1.1 *base substrate*—a material upon which films, treatments, adhesives, sealants, membranes, and coatings are applied. The base substrate can also be considered to be the actual

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² Annual Book of ASTM Standards, Vol 06.01.

³ Annual Book of ASTM Standards, Vol 06.02.

⁴ Annual Book of ASTM Standards, Vol 04.07.

material of construction that the surface is attached to. This does not refer to the layers of paint under the outermost or surface layer.

3.1.2 *painted element*—a painted architectural or building component. See 5.2 and 5.4.2 for examples of painted elements.

3.1.3 *subsurface layers*—layers of material that may exist on a base substrate and which are underneath the outermost layer, or surface, on a base substrate.

3.1.4 *surface*—the outermost layer of material on a base substrate facing the inspector or occupants.

4. Significance and Use

4.1 Encapsulation provides a means of protecting occupants from exposure to lead in paint in buildings that are likely to remain standing for a long period of time. This nondestructive abatement strategy is useful in situations in which the primary structure needs to remain intact for either historical or economic reasons. Encapsulation offers an abatement strategy that may be more cost effective than abatement by removal of the paint.

4.2 There are many environmental and use conditions that affect leaded paint liquid coating encapsulation products, and different types of liquid coating encapsulation products have been developed specifically to meet the requirements of the various conditions. Product types include reinforced and non-reinforced liquid coatings, as well as products for interior or exterior use. These products may be applied over many different surfaces coated with one or more layers of leaded paint and possibly other coatings. Encapsulation products in service are subjected to many kinds of wear. Various colors and finishes are also available. This guide is intended to assist the purchaser in determining which product is most appropriate for the specific conditions under which the product will be used.

4.3 As described in this guide, an encapsulation product must be compatible with the surface to which it is applied. It shall be determined that the encapsulation product not only bonds to the top surface layer, but also does not cause the subsurface layers to separate. Also, the product shall not affect the properties of the leaded paint coated surface adversely.

5. Determining the Suitability of a Painted Element for Encapsulation

5.1 Prior to selecting a liquid coating encapsulation product, the base substrate, subsurface layers, and surface to be encapsulated should be assessed to determine whether they are suitable for encapsulation and to provide information to be used when selecting an encapsulation product type. The assessment should include evaluating both the condition of the base substrate, and the integrity of the existing subsurface layers and determining the surface use conditions, such as the degree of impact, abrasion, or weathering that the surface receives. Records that contain information concerning the location of the surface within the structure, the condition of the base substrate and subsurface layers, and whether the surface is suitable for encapsulation should be kept by the homeowner, architect, engineer, or landlord.

5.2 *Painted Elements*—When assessing surfaces to be encapsulated, all painted elements to be encapsulated should be

identified and assessed individually since these components may experience different use and environmental conditions. Different painted elements within a room often have distinct paint histories, which can affect their suitability for encapsulation. Examples of painted elements include walls, doors, door jambs, window sills, window casings, and chair rails.

5.3 *Assessment of Base Substrates*—The base substrate may be composed of wood, metal, plaster, masonry, or other building material(s). The base substrate should be sound and intact, or made so, before application of the liquid coating encapsulation product. Encapsulating a surface that exhibits large-scale, systemic damage to the base substrate may not be effective since the damaged substrate may not have the structural integrity needed to support a liquid coating encapsulation product. The overall condition of the base substrate should be evaluated first for evidence of structural integrity and systemic damage, such as moisture or water damage, that might cause the surface to be ineligible for encapsulation until it is repaired. The source of the systemic damage should be ascertained and repaired before any further assessment continues. Next, the surface should be evaluated for localized damage such as cracks, holes, or other signs of deterioration. Spot repairs to correct localized damage may be necessary in order to provide a surface that can be encapsulated successfully.

5.4 Assessment of Surface and Subsurface Layers:

5.4.1 A comprehensive assessment of the condition of the existing surface and subsurface layers should be performed in order to determine whether the painted element can be encapsulated successfully. The condition of the existing surface and subsurface layers should be examined visually for signs of deterioration. The type and extent of the deterioration and whether the areas of deterioration are systemic, random, or localized should be evaluated. The surface should be assessed visually for cleanliness since food, oil, grease, and dirt can affect the adhesion of the encapsulant to the surface. The amount of abrasion that the surface experiences should be evaluated and repairs made to reduce abrasion if necessary. The surface should be examined for signs of chalking. Adhesion tests should be performed to evaluate the cohesive strength of the subsurface layers. The procedures for performing the entire assessment are explained below.

5.4.2 *Types of Surface and Subsurface Layer Deterioration*—The surface should be evaluated for evidence of chipping, flaking, peeling, cracking, checking, blistering, or broken paint. Small, localized areas of deteriorated paint that are not caused by an ongoing, underlying source can be repaired by priming, patching, bridging, smoothing, wet-sanding, or other methods. The painted element to be encapsulated should be evaluated for the amount of abrasion and repeated impact it experiences during use. Painted elements that experience extreme abrasion or repeated impact are generally not suitable for encapsulation. These painted elements include, but are not limited to window headers, stops, mullions, sashes and parting beads, inside door jambs, floors, and stair treads. Painted elements that contain surfaces that rub together, such as drawers or cabinet doors, might also be ineligible for encapsulation. The surface may be eligible for encapsulation if the source of abrasion can be eliminated by

such steps as scaling windows or planing doors.

5.4.3 Extent of Deterioration—The painted element should be evaluated to determine what portion of it contains deteriorated paint. If relatively small, localized areas of the paint reveal evidence of chipping, flaking, peeling, cracking, or blistering, the deteriorated areas can be primed, wet-sanded, or otherwise repaired to render an intact surface for encapsulation. If large areas exhibit signs of deterioration, other abatement methods should be considered since extensive surface preparation will be required. Large areas of deterioration can be indicative of underlying, ongoing sources of the deterioration including, but not limited to water leaks, thermal changes, incompatible paints, or excessive paint thicknesses.

5.4.4 Localized, Random, or Systemic Deterioration—The surface should be examined for evidence of persistent, underlying sources of deteriorated existing paint. Sources of deterioration include excessive moisture, sudden or dramatic temperature changes, high humidity conditions, incompatible paints, or excessive paint thicknesses. Areas of random deterioration or areas of deterioration that are widely dispersed over the entire surface can be evidence of an ongoing, underlying problem. The source of the deterioration should be identified and corrected before the encapsulation process begins. Smaller, localized areas of deterioration that have an external source, such as previous wear or abuse, can be repaired by patching, smoothing, bridging, wet-sanding, or other methods after the source has been eliminated.

5.4.5 Assessment of Painted Surfaces for Chalk—An assessment of the amount of chalk on the surface should be conducted in accordance with Test Methods D 4214. This can be accomplished by running one or more gloved fingers on the painted or coated surface. (A contrasting colored glove provides a more visible surface to evaluate for chalking.) Paint residue or chalk visible on the glove is evidence that the paint surface has degraded. This residue is different from household dust. If chalk is visible on the glove, the chalk should be removed or the surface should be treated with a suitable sealant or primer prior to the application of a liquid coating encapsulation product.

5.4.6 Pull-Off Tape Test for Adhesion—An initial tape test should be performed on each painted element to be encapsulated in order to quickly evaluate the adhesion between the layers of the existing paint. A surface is generally not suitable for encapsulation if any material comes off the surface onto the tape. The test results for a particular painted element might vary since the amount of deterioration between paint layers is often not uniform over the entire painted element. To perform the pull-off adhesion tape test, place a piece of pressure-sensitive tape⁵, 125 to 150 mm (5 to 6 in.) long by 50 mm (2 in.) wide, over the surface to be tested. The surface to be tested should be clean and dry. Press the tape firmly against the surface. Smooth the tape into place, and rub firmly with the eraser end of a pencil. Within 90 s of application, remove the tape smoothly and rapidly, at an angle as close to 180° as possible. Examine the tape. There should be no paint or any

other material from the surface being tested on the back of the tape. The surface is generally not suitable for encapsulation, if any material comes off the surface onto the tape.

5.4.7 Assessment of Painted Surfaces for Adhesion—For painted elements passing the initial adhesion test, conduct the “X” cut adhesion test in accordance with Test Methods D 3359, Method A. The minimum performance rating should be 3A to ensure that the existing paint has adequate adhesive and cohesive strength to support additional stresses caused by the application of an encapsulation product.

5.4.7.1 Causes of Poor Adhesion Test Results—An incompatibility between existing subsurface layers can cause one or more of the layers to pull away from the surface easily. Examples of incompatible existing layers include, but are not limited to the following: a layer of flat latex paint over an improperly prepared, glossy, oil-based enamel paint; a poor-quality paint layer that is not adhering well to the underlying base substrate; and multiple layers of paint that have begun to pull away from the base substrate or other existing subsurface layers. Extremely thick existing paint layers can also result in poor adhesion.

6. Selection of a Liquid Coating Encapsulation Product

6.1 This section provides guidance for selecting a liquid coating encapsulation product after the surfaces to be encapsulated have been assessed for suitability, as directed in Section 5. Encapsulation products have been developed for specific uses and should be used only in those areas recommended by the manufacturer. Contact the manufacturer or refer to product data sheets for information regarding appropriate use situations for the product. It is recommended that patch tests to assess the adhesion of the liquid coating encapsulation product be performed for all candidate products before starting the encapsulation project.

6.2 Primers—Some liquid coating encapsulation product manufacturers require special surface treatment such as the use of special commercial primers not supplied with their standard encapsulation products. Contact the encapsulation product manufacturer or refer to product data sheets for information regarding any specialty primers that should be used with the product.

6.3 Thickness—Extremely thick encapsulation products might obscure architectural details of the surface. Manufacturer’s recommendations should be obtained when the product thickness might be of concern. Reinforced products are usually thicker than non-reinforced products.

6.4 Exterior Conditions—Encapsulation products used on exterior surfaces should resist degradation due to weather and local environmental conditions such as ultraviolet light, moisture, variations in temperature, oxidants, mildew, and acidic precipitation. The manufacturer should be consulted for recommendations regarding exterior use of a particular encapsulation product.

6.5 Alkalinity—Excessively alkaline surfaces may cause deterioration of some encapsulation products. If surfaces are alkaline (for example, concrete, fresh plaster, and mortar), an alkaline-resistant product should be chosen. Patch tests should be allowed to remain in place for as long a period of time as possible so that signs of incompatibility can be detected. If the

⁵ Adhesive tape, such as Permacel 99 or 3M No. 710 tape, has been found suitable for this purpose.