



Designation: D8397 – 23

Standard Specification for Acrylic and Reactive Adhesives for Installation of Vinyl and Rubber Floor Coverings¹

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1. Scope

1.1 This specification establishes minimum requirements for adhesives used for the installation of resilient floor coverings, within a climate-controlled structure, when adhered directly and permanently to a structurally sound and recommended substrate.

1.2 This specification will provide the means to determine adhesive bonding as a result of different resilient flooring backing systems used with PVC and rubber flooring materials.

1.3 Adhesives referenced in this specification may also be used for installation of carpets outlined in Specification D7799. Test methods and practices referenced in this specification will provide the means to determine adhesive bonding for PVC backed carpet types, whether classified as broadloom or tile.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

- 2.1 *ASTM Standards:*²
D907 Terminology of Adhesives

¹ This specification is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.10 on Working Properties.

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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* volume information, refer to the standard's Document Summary page on the ASTM website.

- D1084 Test Methods for Viscosity of Adhesives
- D1337 Practice for Storage Life of Adhesives by Viscosity and Bond Strength
- D2556 Test Method for Apparent Viscosity of Adhesives Having Shear-Rate-Dependent Flow Properties Using Rotational Viscometry
- D4783 Test Methods for Resistance of Adhesive Preparations in Container to Attack by Bacteria, Yeast, and Fungi
- D6004 Test Method for Determining Adhesive Shear Strength of Resilient Flooring and Carpet Adhesives
- D6862 Test Method for 90 Degree Peel Resistance of Adhesives
- D6962 Practice for Operation of a Roller Chair Tester for Pile Yarn Floor Coverings
- D7149 Practice for Determining the Freeze Thaw Stability of Adhesives
- D7799 Specification for Tufted and Woven Broadloom Carpet Adhesives Without Homogenous PVC or Non-PVC Backings
- D7888 Practice for Evaluating Adhesive and the Effects of Plasticizer Found Within Polyvinyl Chloride-Backed Floor Coverings
- F2199 Test Method for Determining Dimensional Stability and Curling Properties of Resilient Flooring after Exposure to Heat

2.2 Other Standards:

- California Specification 01350 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1³
- ISO 4918 Resilient, textile and laminate floor coverings — Castor chair test⁴
- OSHA Regulations 29 CFR 1910.1200 Hazard communication⁵
- SQAQMD 1168 Adhesive and Sealant Applications⁶

³ Available from CalRecycle, <http://calrecycle.ca.gov>.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., NW, Washington, DC 20210, <http://www.osha.gov>.

⁶ Available from South Coast Air Quality Management District, 21865 Copley Dr, Diamond Bar, CA 91765, <http://www.aqmd.gov>.

Superfund Amendments and Reauthorization Act of 1986
 Title III Section 313 Release Reporting Requirements⁷
 40 CFR 372 Toxic chemical release reporting: Community
 right-to-know⁸

3. Terminology

3.1 Definitions:

3.1.1 Many of the terms in this specification are defined in Terminology **D907**.

3.1.2 *acrylic adhesive, n*—a resin-based bonding material comprised of acrylic or methacrylic polymers and copolymers thereof. Common variations may include but are not limited to vinyl acetate-acrylic or styrene acrylic copolymer materials.

4. Classification

4.1 The adhesives covered by this specification shall be classified as follows:

4.1.1 Acrylic hard set requiring “wet application,” no pressure sensitive properties.

4.1.2 Acrylic pressure sensitive adhesive.

4.1.3 Acrylic hard set with short-term pressure sensitive properties.

NOTE 1—These adhesives cannot be reliably tested by Test Methods **D6004** or **D6862** when the flooring material is applied in its “dry to the touch” state or when there is no transfer of adhesive to the backing of the flooring. It has been found based in experience that when tested in accordance with ISO 4918 or Practice **D6962** that performance criteria can be established.

4.1.4 Polyurethane:

4.1.4.1 Two-part reactive; and

4.1.4.2 Moisture cure.

4.1.5 Epoxy:

4.1.5.1 Two-part reactive.

4.1.6 Silane modified.

5. Ordering Information

5.1 Ordering quantities, lot sizes minimum and maximum, along with packaging availability, container size, etc., shall be determined by the adhesive manufacturer or end user, or both, and may be subject to industry standards. Currently the floor covering industry has found the standard packaging as follows: one (1) quart, one (1) gallon, four (4) gallon containers.

6. Standard Conditioning

6.1 *Conditioning in Air*—Condition the specimens for physical tests in air maintained at 22 °C + 1 °C (73 °F ± 3 °F) and 50 % + 10 % relative humidity for 24 h minimum prior to testing.

7. Chemical Composition

7.1 The adhesive shall contain no reportable quantities of hazardous ingredients as specified by OSHA Regulations 29 CFR 1910.1200.

⁷ Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, <http://www.epa.gov>.

⁸ Available from U.S. Government Publishing Office (GPO), 732 N. Capitol St., NW, Washington, DC 20401, <http://www.gpo.gov>.

7.2 The adhesive shall contain no toxic chemical subject to reporting requirements of Section 313 of Title III of Superfund Amendments and Reauthorization Act of 1986 and of 40 CFR 372.

7.3 The adhesive shall not be reportable as a carcinogen as specified by IARC (International Agency for Research on Cancer), OSHA (Occupational Safety and Health Administration), and NTP (National Toxicology Program).

7.4 The adhesive shall meet the requirements for SCAQMD (South California Air Quality Management District) 1168.

7.5 The adhesive shall identify if it qualifies meeting the requirements for California Specification 01350.

8. Physical Properties

8.1 The adhesive shall be of a consistency free of lumps and of a smooth homogeneous consistency when stirred or trowel applied to surface.

8.2 The initial viscosity of the adhesive shall be determined by Test Methods **D1084** or **D2556** as appropriate and recorded.

8.3 *Shelf Life*—When tested in accordance with Practice **D1337**, adhesive shall show no signs of settling, discoloring, separating, caking, or gelling which might influence the usability of the adhesive. The adhesive shall not display a change in viscosity greater than ±15 % during the identified period by Practice **D1337**. Adhesive shelf life shall be identified on product container or label.

8.4 *Effects of Plasticizer*—When tested in accordance with Practice **D7888**, the dry or cured adhesive film shall show no change in physical appearance from plasticizer found in polyvinyl chloride-backed floor coverings.

8.5 *Freeze-Thaw Stability*—When tested in accordance with Practice **D7149**, adhesive shall show no signs coagulation, no change in troweling application/rheology and no greater than 15 % to 20 % change in viscosity per freeze-thaw cycle. Reporting shall include test temperature and number of freeze-thaw cycles performed. This information shall be identified on labeling.

NOTE 2—It has been generally accepted that the term freeze-thaw stable means that the adhesive shall be able to withstand 5 repeated cycles at the prescribed or advertised temperature without any physical properties compromised.

NOTE 3—Adhesives not meeting freeze-thaw stability properties shall identify on product label to “Protect from Freezing.”

8.6 *Resistance to Bacteria, Yeast and Fungi*—When tested in accordance with Test Methods **D4783** the adhesive shall be shown to have “in container” protection.

9. Performance Requirements

9.1 **Table 1** identifies the minimum requirements for acrylic and reactive adhesives compliance with the specific usage class and the corresponding test methods.

9.2 **Table 1** is for resilient flooring where an acrylic adhesive or similar is used whether described as a “hard setting” or “pressure setting” adhesive, or those with similar physical properties.

TABLE 1 Minimum Requirements for Acrylic and Reactive Adhesives

	Test Method D6004	Test Method D6862	Test Method F2199^A
Sheet Flooring with Backing			
Class A Backing	Min. 1.7 kg/cm ² (25 psi)	Min. 2.1 kN/m (30 lbf/in.)	
Class B Backing	Min. 1.7 kg/cm ² (25 psi)	Min. 2.1 kN/m (30 lbf/in.)	
Class C Backing	Min. 1.7 kg/cm ² (25 psi)	Min. 2.1 kN/m (30 lbf/in.)	
Sheet Flooring without Backing			
Minimum 50 % Binder	Min. 2.1 kg/cm ² (30 psi)	Min. 2.1 kN/m (30 lbf/in.)	
Solid Vinyl Floor Tile			
Class 1 (34 % Binder)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	≤0.38 mm (0.015 in.)
Class 2 (34 % Binder)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	≤0.38 mm (0.015 in.)
Class 3 (Luxury Vinyl Tile and Plank)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	≤0.38 mm (0.015 in.)
Rubber Floor Tile			
Type 1 (Homogeneous)	Min. 2.4 kg/cm ² (35 psi)	Min. 2.1 kN/m (30 lbf/in.)	≤0.38 mm (0.015 in.)
Type 2 (Heterogeneous)	Min. 2.4 kg/cm ² (35 psi)	Min. 2.1 kN/m (30 lbf/in.)	≤0.38 mm (0.015 in.)
Rubber Sheet Flooring with Backing			
Type I (Homogeneous)	Min. 2.4 kg/cm ² (35 psi)	Min. 1.7 kN/m (25 lbf/in.)	
Grade 1 (Fibrous Backing)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	
Grade 2 (Foamed Rubber Backing)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	
Type II (Heterogeneous)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	
Grade 1 (Fibrous Backing)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	
Grade 2 (Foamed Rubber Backing)	Min. 2.1 kg/cm ² (30 psi)	Min. 1.4 kN/m (20 lbf/in.)	

^A Joints or seams made on resilient sheet flooring products during installation are bonded together by heat welding or chemical welding processes, or the use of an epoxy adhesive applied under the seam area, or combinations thereof.

9.3 When following the protocol is outlined in Test Method **F2199**, the test method will be modified to use a substrate to which the flooring material can be adhered, or as recommended by the flooring or adhesive manufacturer.

9.3.1 *Note the Substrate*—Minimum of 6.35 mm (¼ in.) plywood classified as underlayment grade type warranted by the manufacturer. Common wood-based products such as PS1 and PS2 grade mark stamped plywood or oriented strand board substrate, or both. Other materials, such as cementitious boards, that will allow appropriate adhesion or as recommended by the adhesive manufacturer may also be used.

9.4 *Reactive Adhesives General*—**Table 1** minimum requirements can also pertain to all categories of “reactive adhesives” as identified in **4.1.4**, **4.1.5**, and **4.1.6**. Due to the tenacity of their adhesion, the failure mode of these adhesives should be noted as follows:

9.4.1 Adhesive failure to the backing of the flooring material;

9.4.2 Adhesive failure to the substrate/subfloor material; or

9.4.3 Flooring material failure, which would include a break or tear in the flooring material itself or where, upon inspection, a separation of the backing has occurred remaining adhered to the applied adhesive.

9.5 *Roller Chair*—When tested in accordance with ISO 4918 (Practice **D6962**), flooring material shall exhibit no evidence of telegraphing, indentation, delamination, or bond failure. Report 10 000 cycles for residential use and 25 000 cycles for commercial use.

9.5.1 *Note the Substrate*—Minimum of 6.35 mm (¼ in.) plywood classified as underlayment grade type warranted by the manufacturer. Common wood-based products such as PS1 and PS2 grade mark stamped plywood or oriented strand board

substrate, or both. Other materials that will allow appropriate adhesion or as recommended by the adhesive manufacturer may also be used so long as it will be acceptable for use by the roller chair apparatus.

10. Certification

10.1 When specified in the purchase order or contract, a manufacturer’s certification and any other documents required to substantiate certification shall be furnished to the purchaser. When specified in the purchase order or contract, a manufacturer’s certification and any other documents required that state the material meets this specification.

11. Packaging and Package Marking

11.1 Unless otherwise specified in the purchase order or contract, shipping containers shall be marked with the name of the material as defined by the contract or order under which the shipment is made with the quantity contained therein, the name of the manufacturer, and any precautionary statements required.

11.2 The adhesive shall be packaged in accordance with normal commercial practice and packed to ensure acceptance by common carrier and to provide protection against damage during normal shipping, handling, and storage unless other requirements (agreement between the manufacturer and the purchaser) have been put into place.

12. Keywords

12.1 acrylic; adhesive; heterogeneous; homogeneous; luxury vinyl plank; luxury vinyl tile; reactive; rubber sheet flooring; rubber tile; sheet flooring; solid vinyl tile; trowel; underlayment