Designation: ~~D7835/D7835M – 19~~ D7835/D7835M – 23

Standard Test Method for Determining the Solvent Resistance of an Organic Coating Using a Mechanical Rubbing Machine[1]

This standard is issued under the fixed designation D7835/D7835M; 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 test method covers a mechanical rub method for assessing the solvent resistance of an organic coating that chemically and/or physically changes during the curing process. This technique can be used in the laboratory, in the field, or in the fabricating shop.

1.2 This test method does not specify the solvent, number of double rubs, or expected test results.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 *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.*

1.5 *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]

D740 Specification for Methyl Ethyl Ketone

D4138 Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive, Cross-Sectioning Means

D5402 Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs

D5796 Test Method for Measurement of Dry Film Thickness of Thin-Film Coil-Coated Systems by Destructive Means Using a Boring Device

D6132 Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Coating Thickness Gage

D7091 Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.53 on Coil Coated Metal.

Current edition approved ~~Jan. 1, 2019~~Oct. 1, 2023. Published ~~January 2019~~October 2023. Originally approved in 2013. Last previous edition approved in ~~2013~~2019 as D7835/D7835M – ~~13. DOI: 10.1520/D7835/D7835M-19~~19. DOI: 10.1520/D7835/D7835M-23.

[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.

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions:*

3.1.1 *double rub, n*—one complete forward and backward motion over a coated surface under specific conditions, which are characterized by the force applied normal to the surface, the length of travel, and rate of speed.

4. Summary of Test Method

4.1 An automated machine is used to test the solvent resistance of a coating by rubbing a cloth saturated with the solvent across the coating and counting the number of strokes (double rubs) to coating break-through or failure.

5. Significance and Use

5.1 Many coatings used in the coil coating and other industries achieve a degree of solvent resistance after they have experienced a bake condition characterized by exposure to elevated temperatures in an oven over time. Insufficient bake, or occasionally over bake, may affect the intended chemical bonds or physical curing of the film and result in reduced solvent resistance.

5.2 The mechanical rubbing machine provides consistent stroke length, rate, pressure, and contact area that are not subject to variables such as human fatigue (see Practice D5402).

5.3 Factors other than bake can influence degree of solvent resistance of a coated surface. Paint film chemistry and composition, surface preparation, oven dwell time, oven air velocity, ambient oven temperature, oven profiling, film thickness, etc., all are influential. The test solvent used in the rub machine has a significant effect on the number of double rubs measured. Common solvents used for these tests include Methyl Ethyl Ketone (MEK), Methyl Isobutyl Ketone (MIBK), and Isopropyl Alcohol to name a few. The specific solvent to be used and the umber of double rubs to be achieved should be agreed upon between manufacturer and user for any given coating system, thickness, and application.

6. Apparatus

6.1 *Solvent Rub Machine* with operator instructions.

6.1.1 The machine may be any suitable device that drives a mechanical finger through double rubs across the same path on a coated surface and has the following characteristics (see Fig. 1).

6.1.1.1 The mechanical finger must have a flat, smooth, circular surface ~~1.6~~1.6 cm ± 0.2 cm ~~[0.625 ± 0.08 in.]~~ [0.625 in. ± 0.08 in.] diameter.

6.1.1.2 A weighted block must apply ~~3000 ± 50 g~~ 3000 g ± 50 g of pressure to the mechanical finger.

6.1.1.3 Disposable cheesecloth, as specified below, is attached to the contact surface of the finger.

6.1.1.4 There must be some means of maintaining constant saturation of the cheesecloth, typically by a solvent reservoir.

6.1.1.5 The double rub (stroke) length must be ~~20~~20 cm ± 2 cm ~~[8 ± 0.8 in.]~~ [8 in. ± 0.8 in.] (one direction) at a minimum rate of 60 and maximum of 100 double rubs per minute.

6.1.1.6 The number of double strokes must be automatically counted (up or down) and displayed by the machine.

7. Reagents and Materials

7.1 *Methyl Ethyl Ketone (MEK),* conforming to Specification D740.

7.2 *Other Solvents,* as specified by the coating manufacturer or user.