



Designation: D3363 – 20

Standard Test Method for Film Hardness by Pencil Test¹

This standard is issued under the fixed designation D3363; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method covers a procedure for rapid, inexpensive determination of the film hardness of an organic coating on a substrate in terms of drawing leads or pencil leads of known hardness.

1.2 This test method is similar in content (but not technically equivalent) to ISO 15184.

NOTE 1—Other procedures are available to measure permanent deformation of organic coatings under the action of a single point (stylus tip) including but not limited to Test Methods [D2197](#), [D5178](#), and [G171](#).

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

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

[D2197 Test Method for Adhesion of Organic Coatings by Scrape Adhesion](#)

[D5178 Test Method for Mar Resistance of Organic Coatings](#)

[G171 Test Method for Scratch Hardness of Materials Using a Diamond Stylus](#)

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 D01.23 on Physical Properties of Applied Paint Films.

Current edition approved Sept. 1, 2020. Published September 2020. Originally approved in 1974. Last previous edition approved in 2011 as D3363 – 05 (2011)^{ε2} which was withdrawn in May 2020 and reinstated in September 2020. DOI: 10.1520/D3363-20.

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.

2.2 *Other Standards:*

[ISO 15184 Determination of film hardness by pencil test.](#)³

3. Summary of Test Method

3.1 A coated panel is placed on a firm horizontal surface. The pencil is held firmly against the film at a 45° angle (point away from the operator) and pushed away from the operator in a 6.5-mm (1/4-in.) stroke. The process is started with the hardest pencil and continued down the scale of hardness to either of two end points: one, the pencil that will not cut into or gouge the film (pencil hardness), or two, the pencil that will not scratch the film (scratch hardness).

4. Significance and Use

4.1 Pencil hardness measurements have been used by the coatings industry for many years to determine the hardness of clear and pigmented organic coating films. This test method has also been used to determine the cure of these coatings, especially when forced dried using heat.

4.2 This test method is especially useful in developmental work and in production control testing in a single laboratory. It should be recognized that the results obtained may vary between different laboratories when different pencils as well as panels are used. To improve test result reproducibility for a specific group of tests, it is recommended to utilize drawing leads or pencils made by the same manufacturer and from the same batch. If drawing leads or pencils from the same manufacturer and from the same batch are not available at the time of subsequent evaluations, it shall be noted on the test report. For all tests, the manufacturer and lot number of the drawing leads or pencils shall be reported.

NOTE 2—Using leads or pencils made by different manufacturers or from the same manufacturer but different production batches, may result in significant variation for leads within the same pencil hardness scale.

4.3 If this test method is used as a basis for purchase agreement, maximum precision will be achieved if a given set of referee pencils be agreed upon between the purchaser and the seller.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

*A Summary of Changes section appears at the end of this standard