Designation: ~~D2793 – 99 (Reapproved 2011)~~ D2793 – 99 (Reapproved 2017)

Standard Test Method for Block Resistance of Organic Coatings on Wood Panel Substrates[1]

This standard is issued under the fixed designation D2793; 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 the determination of the block resistance of organic coatings on wood and wood-based panel substrates. Block resistance is the ability of a coating to resist sticking to another surface and to resist any change in appearance when it is pressed against that surface for a prolonged period of time.

1.2 General methods for determining block resistance are outlined in Sections 6 and 7. Variations inherent in user materials and procedures, however, may dictate adjustments to the general method to improve accuracy. Paragraphs 7.3 and 7.4 provide guidelines for tailoring the general procedure to a user's specific application. Paragraph 7.5 offers a rating methodology.

1.3 Test Method D2091 should be used for the determination of print resistance or pressure mottling of organic coatings, particularly lacquers, applied to wood-based case goods such as furniture.

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

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 and health 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]

D2091 Test Method for Print Resistance of Lacquers

3. Summary of Test Method

3.1 The coatings are prepared for testing in a manner duplicating production application and curing conditions as nearly as possible on the specified wood substrate. Then a stack of these painted substrates is formed and subjected to a specified pressure and temperature for a sufficient time to develop any sticking tendencies that exist. The pressure is released and the painted surfaces are examined for any signs of sticking or pressure mottling. If blocking (forming a block by panels sticking together) occurs, the material is unsatisfactory. If no sticking or damage to the film surface occurs, the material is satisfactory.

3.2 When the conditions of production finishing are established and known, the method of application, the substrate, film thickness, and cure of the film should duplicate these conditions as closely as possible. However, some acceleration of the test may be possible with more severe conditions.

4. Significance and Use

4.1 Coated wood panel products must be stacked face to face or face to back during warehousing, packaging, and transportation without the coated finish sticking (blocking) and becoming damaged. This test method describes a laboratory means of evaluating conditions of blocking using factors of pressure, heat, time and moisture.

[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 D01.52 on Factory Coated Wood Products.

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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~~standard's Document Summary page on the ASTM website.

4.2 Degrees of hardness or degrees of cure of organic coatings, or both, can be evaluated using a blocking test.

4.3 The rate of volatile loss (drying speed) of organic coatings can be evaluated using a blocking test.

4.4 The effectiveness of protective packaging materials (slip sheets) for organic coatings on wood substrates can be evaluated using a blocking test.

5. Apparatus

5.1 *Hydraulic Press* (preferably constant pressure), capable of maintaining the agreed upon stacking pressure.

5.2 *Rigid Platens,* at least 4 in. (100 mm) square, capable of being maintained at the desired test temperature.

6. Test Specimens

6.1 For those cases where the intended use conditions are not established or known, the following specifications or some set of specifications agreed upon between the purchaser and seller apply:

6.1.1 The test coating shall be applied by spray to a panel.

6.1.2 The panel shall be a piece of 6.4 mm (¼ in.) smooth two side (S2S) standard hardboard or other thickness and type of wood substrate.

6.1.3 The dry film thickness of pigmented coatings shall be 1.5 ± 0.2 mils (38 ± 5 µm), and of clear coatings, shall be 30 ± 5 µm (1.2 ± 0.2 mils) or other agreed upon film thickness. Cure of the coating shall be as agreed and should be standardized for each coating.

NOTE 1—Film thickness can be measured by weight differences before and after painting, but this requires careful conditioning of the substrate under standard temperature and humidity conditions prior to each weighing. Film thickness can also be determined by using an aluminum tab alongside the test panel and measuring the film thickness with a standard eddy-current gage or using a steel panel with a magnetic film thickness gage. Alternatively, on smooth surface boards, a draw down bar applicator with known film thickness delivery may be used.

7. Procedure

7.1 After an agreed upon time (after sample preparation) under ambient conditions, prepare a stack of six samples as follows (from bottom to top):

(1) one face up,
(2) two face down,
(3) one face up,
(4) two face down.

This provides two face-to-face and face-to-back contacts. If slipsheeting materials are utilized or are under consideration, include them between the appropriate interfaces.

7.2 Preheat the press platens to 49 ± 1°C (120 ± 2°F) or other agreed upon temperature. Insert the sample stack into the press and apply the load for a minimum of 24 h, through rigid pressure platens using one of the following conditions:

Class A80 psi ± 4 psi (560 kPa ± 28 kPa)
Class B40 psi ± 2 psi (280 kPa ± 14 kPa)
Class C20 psi ± 1 psi (140 kPa ± 7 kPa)
Class D5 psi ± 0.25 psi (35 kPa ± 1.7 kPa)

These classes are arbitrary and merely represent tests of greater to lesser severity depending upon materials and procedures of the end user. Other pressures, types of pressure plates or times, or combination thereof, may be used as agreed upon between purchaser and seller.

7.3 Determination of valid pressures for use in the blocking procedure is not easy. In practice, pressures of 20 to 100 psi (140 to 200 kPa) have proven suitable for hardboard substrates: 2 to 5 psi (14–35 kPa) for solid wood substrates. Where no procedure exists, approximations may be made using a calculation of production stacking pressure, as follows:

$$(DHA_1/A_2) \times F \tag{1}$$

where:

D = board density,
H = stack height,
A_1 = stack area,
A_2 = support area, and
F = safety factor.