Designation: D7433 – 13

Standard Test Method for Measuring Surface Water Absorption of Overlaid Wood-Based Panels[1]

This standard is issued under the fixed designation D7433; 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 quantity of water absorbed in a specified time through the surface of an overlaid wood-based panel. The test method measures the rate of water gain within a controlled surface area of the overlaid panel surface when exposed to standing water. The method was adapted from the principles of Test Method D5795.

1.2 This test method is applicable to various overlaid wood-based panels including, but not limited to, plywood (such as MDO grades and HDO grades referenced in PS 1–09), oriented strand board, medium density fiberboard, particleboard, and hardboard.

1.3 This test method does not address sampling procedures, number of replications nor performance criteria since those details vary depending upon the purpose of the testing and the type of product. The method is specific to the panel surface and does not evaluate water absorption or edge swell that may occur along panel edges. The method does not consider the variables related to in-service moisture conditions and therefore does not claim to directly relate to water absorption that may occur in actual panel use situations.

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

1.5 *This test method 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 test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D5795 Test Method for Determination of Liquid Water Absorption of Coated Hardboard and Other Composite Wood Products Via"Cobb Ring" Apparatus

D4442 Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials

2.2 *Other Standards:*[3]

PS 1–09 U.S. Voluntary Product Standard, Structural Plywood

3. Significance and Use

3.1 Water absorptiveness through the surface of an overlaid panel is a function of various characteristics of the overlay and substrate, including overlay resin content, thickness of the overlay, porosity, and permeability.

3.2 This test method is useful in comparing the water absorption characteristics of different overlaid panel products. The results from this test method are influenced by both the performance of the overlay system and the panel substrate. Therefore, the results are appropriate for comparison of the relative performance of an overlay system when tested over similar or matched panel substrates.

NOTE 1—Panel attributes that may influence water absorption include, but are not limited to, panel type, wood species, face veneer thickness and grade, preoverlay surface treatment such as sanding, particle geometry and compaction ratio.

[1] This test method is under the jurisdiction of ASTM Committee D07 on Wood and is the direct responsibility of Subcommittee D07.03 on Panel 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 Document Summary page on the ASTM website.

[3] Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, http://www.nist.gov/standards

4. Test Apparatus and Materials

4.1 Rings, formed by cut sections of metal or plastic pipe with inside diameter of approximately 108 mm (4.25 in.) which can be sealed to the overlaid panel with silicone or elastomeric sealant.

4.2 Scale, to measure the depth of water column within 0.5 mm (0.020 in.) accuracy. The cross section of the scale shall be as small as practical to minimize interference with the water depth.

NOTE 2—A steel pocket scale with etched graduations at 0.01 in. is suitable.

4.3 Mixture of equal parts beeswax and rosin, to create a coating for the exterior of the specimen in order to prevent weight change due to absorption or desorption of moisture from the panel specimen in areas other than the test area. Other sealants that provide equivalent water repellency are permitted.

4.4 Hotplate and suitable pan for melting the mixture of beeswax and rosin in which the specimens are dipped.

4.5 Balance, with an accuracy of 0.01 g.

4.6 Water, distilled or deionized.

4.7 Sealant, 100 % silicone or elastomeric, which do not contribute to the assembly weight change through absorption of water.

4.8 Aluminum foil or other sheet material that will form a vapor resistant seal.

5. Test Procedure

5.1 *Specimen Preparation:*

5.1.1 When a standardized dry initial condition is required, the panels shall be brought to moisture equilibrium in a conditioned environment of 20 ± 6 °C (68 ± 11 °F) and 65% (±5%) relative humidity.

NOTE 3—Depending upon the purpose of the tests, other panel moisture conditions are permitted.

5.1.2 The initial panel moisture content of adjacent specimens shall be measured in accordance with Test Method D4442.

5.1.3 Cut overlaid panel test specimens to 150 × 150 mm (6.0 × 6.0 in.).

5.1.4 Measure the inside diameter of the ring to the nearest 0.5 mm (0.02 in.).

5.1.5 Apply a bead of silicone or elastomeric sealant to the end of the ring.

NOTE 4—The bead of sealant should be approximately 3 mm (0.125 in.) for suitable performance.

5.1.6 Center the ring over the face of the specimens, then press and position the ring against the specimen to obtain a good seal.

5.1.7 Allow the sealant to cure for a minimum of 48 hours at 20 ± 6°C (68 ± 11°F).

5.1.8 Seal all specimen surfaces of the specimen outside of the ring by dipping the specimen into a molten mixture of 50 % beeswax and 50 % rosin or other sealant with equivalent water repellancy.

5.2 *Specimen Exposure to Water:*

5.2.1 Determine the mass of the specimen to an accuracy of 0.01 gram. Place the specimen on a level surface. Fill the ring with water to a depth of 25.4 mm with a tolerance of +0.5/-0.0 mm (1 in., + .02/-0.00 in.). Measure and record the water depth.

5.2.2 Cover the ring with aluminum foil or other suitable vapor barrier to prevent evaporation.

5.2.3 Measure and record the height of the water column after soaking for 24 h, +0.2/-0.0 h. Add water if needed to return the water level to 25.4 mm with a tolerance of +0.5/-0.0 mm (1.00 in., +0.02/-0.00 in.).

5.2.4 Measure and record the height of the water column after soaking for a total of 48 h, +0.2/-0.0 h. Empty the water from the rings and blot the area dry.

5.2.5 Determine the mass of the specimens to an accuracy of 0.01 g.

5.3 Calculate the water absorption through the surface.

5.3.1 Calculate the area of the overlay exposed to wetting from the measured inside diameter of the pipe.

5.3.2 Compute the water absorption (WA48) as follows:

$$WA_{48} = (F - I)/A \quad (1)$$

where:

WA_{48} = Water absorption at 48 h, gram/m^2,
F = mass of specimen after 48-h soak, g,
I = mass of specimen before exposure to water, g,
A = area of specimen exposed to wetting, m^2.

6. Report

6.1 Report the following information for each test.

6.2 The initial moisture condition and moisture content of the panel specimens.

6.3 A description of the overlay.

NOTE 5—The relevant descriptive details of the overlay will vary depending upon the purpose of the test, but should include information such as manufacturer, resin loading, thickness.

6.4 A description of the substrate panel.

NOTE 6—The relevant descriptive details of the panel substrate will vary depending upon the purpose of the test, but should include information such as manufacturer, panel type, wood species of the surface layer, thickness, panel grade or grade of surface that is overlaid.

6.5 Total duration of water soak to the nearest one-tenth hour.

6.6 Depth of water column at beginning of soak period and at 24- and 48-h exposure periods.

6.7 Water absorption at 48 h, calculated as the grams of water absorbed per square meter.

6.8 Any deviations from these methods shall be reported.

7. Precision and Bias

7.1 There has not been a study to determine repeatability and reproducibility of this method.

7.2 *Bias*—No bias statement is available for this test method due to the lack of an acceptable homogeneous reference material.

8. Keywords

8.1 wood-based panels; water absorption; overlays; Cobb Ring