



Standard Test Method for Water Absorption (Static) of Vegetable Tanned Leather¹

This standard is issued under the fixed designation D1815; 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 the determination of the amount of water absorbed by leather at $23 \pm 2^\circ\text{C}$ by immersion under static conditions. It may be used on all types of leather, but is particularly adapted to vegetable-tanned sole leather. This test method does not apply to wet blue.

1.2 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1516 Test Method for Width of Leather

D1517 Terminology Relating to Leather

D1813 Test Method for Measuring Thickness of Leather Test Specimens

3. Terminology

3.1 For definitions of leather terms used in this standard refer to Terminology D1517.

4. Summary of Test Method

4.1 In this test method the amount of water absorbed by a leather specimen is measured at room temperature with all surfaces exposed to water.

5. Significance and Use

5.1 This test method is currently used to determine compliance with specifications for water absorption of impregnated sole leather. The significance of the test method is limited by

¹ This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.07 on Physical Properties. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method E30 – 1956).

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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.

the static conditions employed, and the results do not reflect the water absorption under the dynamic conditions of flexing. The result may be corrected, if required, for any water-soluble material removed from the leather during the test.

6. Apparatus

6.1 *Immersion Dish*, glass or other noncorrosive material, having a flat bottom at least 3 by 5 in. (76 by 127 mm).

6.2 *Balance*, sensitive to 0.01 g.

6.3 *Steel Scale or Tape*, conforming to the requirements in Section 2 of Test Method D1516.

6.4 *Thickness Gage*, conforming to the requirements in Section 3 of Test Method D1813.

6.5 *Blotting Paper or Filter Paper*.

6.6 *Drying Oven*.

6.7 *Pieces of Glass Rod*, for supporting and weighting the specimen.

6.8 *Crystallizing Dish*, borosilicate glass, 50 mm tall, 70 mm in outside diameter.

7. Test Specimen

7.1 The test specimen shall be a rectangle of leather approximately 2 by 4 in. (51 by 102 mm).

7.2 Unless otherwise specified in the detail specification, one specimen from each test unit of sample shall be tested.

8. Procedure

8.1 Determine the length, width, and thickness of the specimen in accordance with Test Method D1516 and Test Method D1813. Calculate its volume in cubic centimetres.

8.2 Weigh the specimen to the nearest 0.01 g and record this mass as W_1 .

8.3 Place the specimen in the immersion dish in a horizontal position with the grain side up. Support it on glass rods or beads and weighted with pieces of glass rod to keep it immersed. Carefully pour distilled water at $23 \pm 2^\circ\text{C}$ into the dish until the specimen is fully immersed, using at least 10 g of water per gram of specimen.

8.4 Leave the specimen immersed for a period of 30 min, 2 h, or 24 h, as required.

8.5 At the end of the immersion period, remove the specimen and blot the surface water with filter paper. Weigh the specimen immediately to the nearest 0.01 g and record this mass as W_2 .

8.6 If a further immersion time is required, reimmerse the specimen after it has been in the air for a total of 5 min, including the weighing time. The total immersion shall be considered to exclude these 5-min weighing periods.

8.7 If a correction is required for water-soluble material removed during the immersion period, proceed as follows: At the end of any immersion period stir the water in the immersion dish thoroughly, transfer it to a beaker, and weigh to the nearest 0.1 g. Record the total mass of the water as W_w . Take an aliquot of 25 mL of the water from the beaker, put it in weighed tannin dish, and dry at 105°C. Weigh the tannin dish and residue and determine the mass of the residue, W_r . Calculate the total mass of the extracted watersoluble material, W_3 , as follows:

$$W_3 = (W_w \times W_r) / 25 \quad (1)$$

Return the remainder of the water to the immersion dish and continue the test.

9. Calculations

9.1 Calculate the amount of water absorbed by the specimen, in grams per cubic centimetre, as follows:

$$\text{Water absorbed, g/cm}^3 = (W_2 - W_1) / V \quad (2)$$

where:

W_1 = mass of the original specimen, g,
 W_2 = mass of the specimen after immersion in water, g, and
 V = volume of the specimen, cm³.

9.2 Calculate the amount of water absorbed by the specimen, in grams per cubic centimetre, after correction for water-soluble material, as follows:

$$\text{Water absorbed, g/cm}^3 = [(W_2 + W_3) - W_1] / V \quad (3)$$

where:

W_3 = mass of the material dissolved from the specimen by water (8.7).

10. Report

10.1 The report shall include the following:

10.1.1 Water absorption of the sample in grams per cubic centimetre, reported as the average of the amounts of water absorbed by the specimens,

10.1.2 Length of time of immersion, and

10.1.3 Whether or not a correction has been made for water-soluble material.

11. Precision

11.1 Measurements made on consecutive samples of untreated sole leather sampled in the standard test area can be expected to yield a standard deviation of ± 0.02 g/cm³ in the measurement of water absorption. A standard deviation of ± 0.04 g/cm³ can be expected between measurements from different hides in a lot sampled in the standard test area.

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