



Designation: D2099 – 14 (Reapproved 2023)

Standard Test Method for Dynamic Water Resistance of Shoe Upper Leather by the Maeser Water Penetration Tester¹

This standard is issued under the fixed designation D2099; 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 dynamic water resistance of shoe upper leather by the Maeser water penetration tester. It is applicable to all types of shoe upper leather. Certain waterproof processes can cause contamination of the stainless steel balls. When this happens, visual inspection is recommended. This test method does not apply to wet blue.

1.2 Initial water penetration and water absorption can be measured by this test method.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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

D1610 Practice for Conditioning Leather and Leather Products for Testing

D2098 Test Method for Dynamic Water Resistance of Shoe

Upper Leather by the Dow Corning Leather Tester
D2813 Practice for Sampling Leather for Physical and Chemical Tests

3. Significance and Use

3.1 This test method is intended to estimate the water resistance of shoe upper leather. The flex imparted to the leather is similar to the flex given the vamp of the shoe in actual wear.

NOTE 1—There is an indication that this test method cannot be used interchangeably for specification purposes with Test Method D2098.

4. Apparatus

4.1 *Balance*, sensitive to 0.01 g.

4.2 *Maeser Water Penetration Tester*, as shown in Fig. 1, or its equivalent. The essential features of the machine are:

4.2.1 *Specimen Holder*, made of two V-shaped clamps with wedges for holding the specimen. The clamps shall be 2.5 in. $\pm$ 0.1 in. (63.5 mm $\pm$ 2.5 mm) apart, inside measurement, when their tops are in the same horizontal plane. One clamp shall be in a fixed position. The other clamp shall be pivoted as shown in Fig. 1 and attached, through a connecting link, to a motor-driven eccentric which turns at 90 r/min $\pm$ 5 r/min. In one rotation of the eccentric, the center of the top of the movable clamp shall move a distance of 1 in. $\pm$ 0.05 in. (25.4 mm $\pm$ 1.3 mm) below the horizontal and return.

4.2.2 *Water Tank*, made of copper, stainless steel, or other noncorrosive material. It shall be of such a size that it can be placed around the clamps and of such a depth that, when in position for use, the top is 1.25 in. to 1.5 in. (31.7 mm to 38.1 mm) above the lowest point of the flexed clamp.

4.3 *Base for the Water Tank*, which is removable from between the machine frame and the water tank.

4.4 Two systems can be used to determine the number of cycles through which the specimen is flexed. One shall be a mechanical reset counter connected to the movable clamp. The other system shall be electrical and consist of a high and common electrode. The recommended resistance across the common electrodes is 50 000 Ω . When the resistance falls below this value, the relay will be energized. The high

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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.

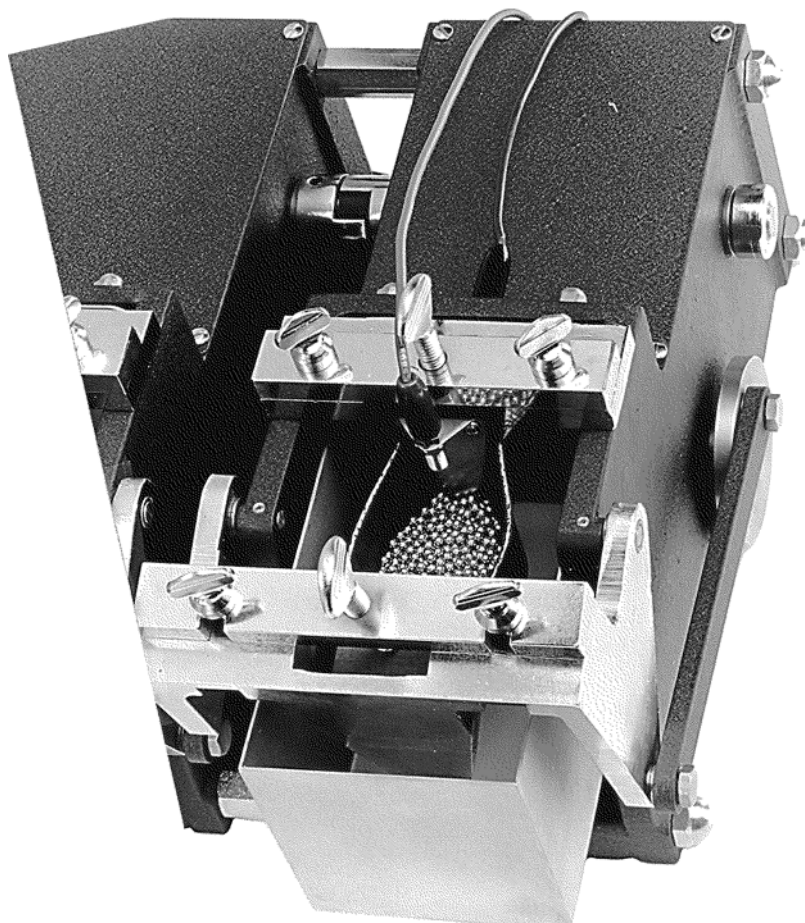


FIG. 1 Maeser Water Penetration Tester



FIG. 1 Maeser Water Penetration Tester (continued)

electrode shown is inside the leather specimen in contact with the steel balls. The common electrode is in a salt solution which is in continuous contact with the specimen during flexing.

4.5 Initial water penetration is detected by a current leakage from the high electrode through the specimen to the common electrode in the conducting solution. This causes a thyatron tube to fire, opening the relay and stopping the machine.