



Designation: D2097 – 03 (Reapproved 2023)

Standard Test Method for Flex Testing of Finish on Upholstery Leather¹

This standard is issued under the fixed designation D2097; 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 flexibility and adhesion of a finish on upholstery leather.² This test method does not apply to wet blue.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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.*

1.4 *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:*³

[D1610 Practice for Conditioning Leather and Leather Products for Testing](#)

3. Summary of Test Method

3.1 The leather is mechanically flexed alternately from a flat position into a single or double bend. At the end of a predetermined number of flexing cycles, the leather is visually inspected for finish cracks.

¹ This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.05 on Upholstery. This test method was developed in cooperation with the American Leather Chemists Assn.

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² Several methods of evaluating the resistance of an upholstery leather finish to flexing have been investigated. This method, as described here, has been adopted as standard by the Upholstery Leather Group, Tanners' Council of America.

³ 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.

4. Significance and Use

4.1 This test method simulates the flexing received by upholstery leather in service, and correlation with service is believed to be good. Both the resistance of the finish to cracking and adhesion of the finish to the leather can be evaluated.

4.2 The flexing action received by the leather in this method is more severe than that given by methods for shoe upper leather. The less severe tests have little utility in the evaluation of upholstery leather finishes.

4.3 This test method is suitable, and has been useful, in research, development, and manufacturing control. It is used as a method of test for specification acceptance. Since this is a subjective test, proper correlation should be established by interlaboratory experience prior to use for specification acceptance.

5. Apparatus

5.1 *Newark Flexing Machine*—This machine,⁴ illustrated in Fig. 1, consists basically of two pistons, one of which is stationary, the other capable of moving at 500 rpm with a stroke of 1¼ in. (32 mm). The movable piston is also adjustable on its shaft in order to vary the distance between the two pistons.

6. Test Specimen

6.1 The test specimen shall be 3 in. by 4½ in. (76 mm by 114 mm) in size.

7. Conditioning

7.1 Bring all test specimens to equilibrium as described in Practice D1610. Usually, maintaining the specimen for 24 h under these conditions will adequately satisfy the equilibrium conditions.

7.2 The test shall also be conducted under the above conditions, described in Practice D1610.

8. Procedure

8.1 Measure the thickness of the specimen to be tested.

⁴ A machine meeting the requirements of this method is available commercially from the Aim Tool & Die Co., 14324 172nd St., Grand Haven, MI 49417. Two versions of this machine are made by Aim Tool & Die Co. Only the standard flexotest machine meets the requirements of this method.

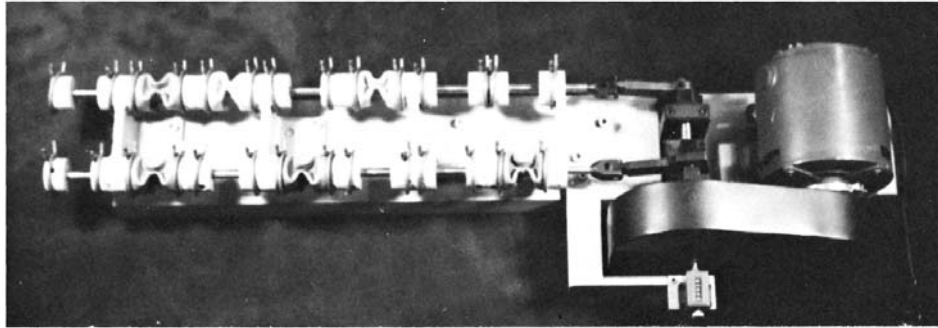


FIG. 1 Newark Flexing Machine

8.2 While in the closed position, adjust the pistons to fifteen times the thickness of the specimen (see Fig. 2).

8.3 Turn the pulley by hand until the pistons are the maximum distance apart. Clamp the specimen around the two pistons without stretching the specimen.

8.4 Complete the first cycle by turning the pulley by hand and forcing the specimen into its flexing pattern (Fig. 3 and Note 1).

NOTE 1—The flexing pattern is achieved as follows: Facing the center front of the specimen, squeeze the sides of the cylindrical specimen with the thumb and middle finger and then force the center inward with the index finger, while the pistons are closed.

8.5 Turn on the power and the specimen will follow this pattern during the whole flexing time.

8.6 At the completion of the test, remove the specimens for evaluation.

NOTE 2—If an evaluation is required before the test is complete, the probe shown in Fig. 4 can be used without removing the specimens.

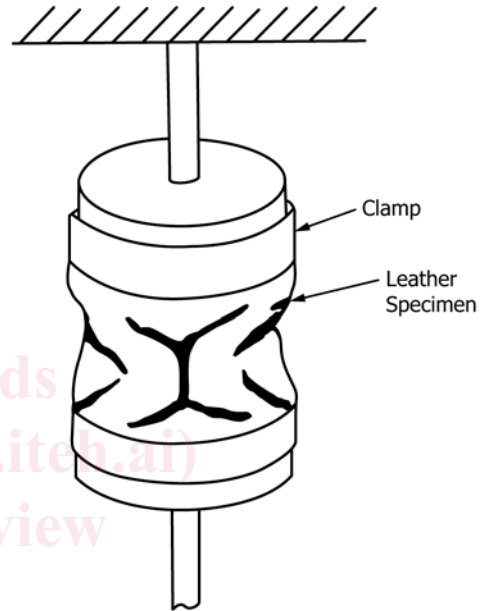
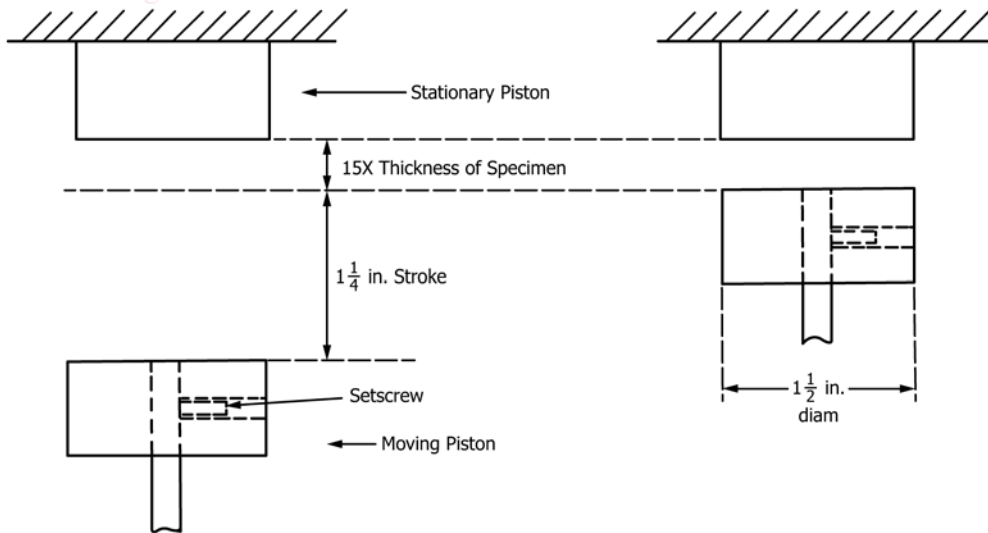


FIG. 3 Flexing Pattern



in.	mm
1¼	32
1½	38

(a) Open Position

(b) Closed Position

FIG. 2 Adjustment of Pistons