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Standard Test Method for Cold-Crack Resistance of Upholstery Leather¹

This standard is issued under the fixed designation D 1912; 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 This test method is under the jurisdiction of ASTM Committee D-31 on Leather and is the direct responsibility of Subcommittee D31.054 on Apparel and Upholstery. This standard was developed in cooperation with the American Leather Chemists Assn.

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1. Scope

1.1 This test method² covers the measurement of the cold-crack resistance on all types of upholstery leathers, but especially in the field of automotive upholstery.³ 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 provided 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Summary of Test Method

2.1 In this test method the cold-crack resistance of upholstery leather is measured by means of a mechanically-applied pressure to a cone-shaped specimen of leather after both the specimen and the pressure-device have been conditioned in a carefully controlled cold cabinet. Both the specimen and the machine remain in the cold cabinet during testing.

3. Significance and Use

3.1 The results are reproducible⁴ and correlate with the cold impact test⁵ and also correlate with actual practice conditions.⁶ A comparison of the significance of this test method with other test methods has also been made.⁴

4. Apparatus

4.1 *Greuel Rotary Cold-Fold Test Machine*,^{7,8} as shown in Fig. 1 and consisting of two tangential knurled rollers driven by a chain drive.

4.2 *Steel Die or Other Shearing Device.*

4.3 *Cold Cabinet*, capable of maintaining temperatures from –50 to +20°F (–45 to –6°C) within ±1°F (0.5°C) and flexible enough so that temperatures can be adjusted easily and quickly in 5° increments.

4.4 *Specimen Racks*, constructed so that the specimens may be suspended in the air by attachment at point C with a paper clip (see Fig. 2).

4.5 *Pliers-Type Stapler.*

4.6 *Temperature Indicator*, with a range from –50 to +20°F (–45 to –6°C) and an accuracy of ±1°F (0.5°C) for measuring the temperature of the area adjacent to the specimens in the cabinet.

² Sometimes referred to as the Greuel Cold-Fold Test in Upholstery Group literature.

³ In the past cold-crack resistance has been measured by various methods which were evaluated by the Upholstery Group Technical Committee in April, 1957, and the Cold-Fold Test was adopted as a standard test in the industry. The method has been adopted by the following groups:

The Upholstery Leather Group, Tanners' Council of America.

Fisher Body Division of General Motors Corp., Specification No. 29.1, dated April 12, 1957.

⁴ Good reproducibility is evidenced by correlation tests conducted by the Upholstery Leather Group Technical Committee in April, 1956 and reported by Fopma, R. J., "Study of Cold-Crack Test for Upholstery Leathers," *The Journal of the American Leather Chemists' Association*, Vol LIV, No. 4, April 1959, p. 194.

⁵ ALCA Test Method E 42, Provisional, April, 1953.

⁶ Upholstery Group Technical Committee, Tanners' Council of America files, "Correlation of Cold-Fold versus Cold Impact Tests versus Actual Cushion Test-ing."

⁷ Detailed drawings of this machine are available at a nominal cost from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428. Request Adjunct No. ~~12-419420-00~~, ADJD1912.

⁸ A

⁸ The sole source of supply of the test machine meeting known to the requirements of committee at this method time is commercially available. For more information write: Aim Tool and Die, 14324 172nd St., Grand Haven, MI 49417. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.



FIG. 1 Greuel Rotary Cold-Fold Test Machine

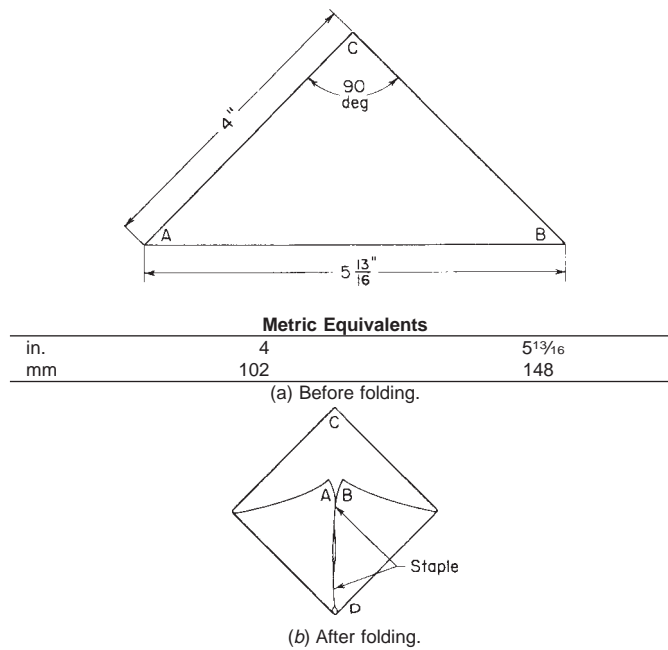


FIG. 2 Method of Folding Test Specimen

5. Test Specimen

5.1 The specimen shall be cut with a die or other shearing device to a size shown in Fig. 2(a). The specimen may be cut from any area on the hide.

5.2 After cutting, the specimen shall be folded and stapled so as to make a cone shape with the finished side out, such as is shown in Fig. 2(b). This is done by stapling as close to the apex of the cone as possible, point *D*, and then stapling points *A* and *B* together. Staples should not go through the back section, *C*. Alternatively, the fastening may be done by means of pressure sensitive tape along the line *AB-D*.

6. Conditioning

6.1 Bring all test specimens into equilibrium in an atmosphere of 50 ± 4 % relative humidity at a temperature of $73 \pm 2^\circ\text{F}$ ($23 \pm 1^\circ\text{C}$) before testing.

6.2 When the cabinet is maintained at the required temperature, hold the specimens for 60 min at this temperature and then test them in the cold-fold test machine.

7. Procedure

7.1 Turn on the cold-fold test machine, open the cabinet, and insert the specimens between the rollers as quickly as possible, being careful the temperature does not change, as indicated by a thermometer in the immediate test area. During the testing, keep the machine in the cold cabinet.

7.2 Handle the specimens with either a pair of tongs or gloves, that have remained in the cold cabinet during conditioning. Insert the specimens between the rolls, point first with the stapled side up.

7.3 Remove the rack and specimens from the cabinet and examine the specimens for cracks as described in 8.1.1.

7.4 If other temperatures of test are required, equilibrate other sets of specimens as described in 6.2 and repeat the procedure. Under no circumstances should specimens that have been put through the machine at one temperature be retested at another temperature.

8. Report

8.1 Report the following information:

8.1.1 Results of the test, reporting as a failure any specimen displaying a crack through the finish to the leather or continuing through the leather.

8.1.2 Temperature at which the specimen fails.

9. Precision and Bias

9.1 The expected precision of this test method is a standard deviation of 5°F (3°C).⁹

10. Keywords

10.1 automotive upholstery; cold-crack; genuine upholstery leather; finish systems; urethane; vinyl; waterbased acrylics

⁹ As determined by The Upholstery Group Technical Committee, see Footnote 5.6.

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