



Standard Test Method for Measuring Cut Resistance of Materials Used in Protective Clothing¹

This standard is issued under the fixed designation F 1790; 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 measurement of the cut resistance of a material when mounted on a mandrel and subjected to a cutting edge under a specified load.

1.1.1 This procedure is not valid for high-porosity materials which allow cutting edge contact with the mounting surface prior to cutting.

1.1.2 Test apparatus may have limitations in testing thicker materials; see the Annex, or the equipment manufacturer's specifications.

1.2 The values stated in SI units or in other units shall be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining values in any way.

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. Referenced Documents

2.1 *ASTM Standards:*²

D 123 Terminology Relating to Textiles

D 1776 Practice for Conditioning Textiles for Testing

F 1494 Terminology Relating to Protective Clothing

3. Terminology

3.1 *Definitions:*

3.1.1 *cut resistance, n*—in blade cut testing, the property that hinders cut through when a material or a combination of materials is exposed to a sharp-edged device.

3.1.2 *cut through, n*—in blade cut resistance tests, the penetration of the cutting edge entirely through material, as

indicated by electrical contact of the cutting edge and the conductive strip or substrate.

3.1.3 *cutting edge, n*—in cut resistance tests, a sharp-edged device used to initiate cut through of a planar structure.

3.1.4 *protective clothing, n*—a product which is specifically designed and constructed for the intended purpose of isolating parts of the body from a potential hazard; or as a barrier to prevent the body from being a source of contamination.

3.1.4.1 *Discussion*—In this test method, the potential hazard is cutting.

3.1.5 *reference distance, n*—in cut resistance testing, a standardized distance for a blade to travel across a material to produce a cut through.

3.1.5.1 *Discussion*—For this test method, the reference distance is 20 mm [0.8 in.].

3.1.6 *rating force, n*—in cut resistance testing, the load required to cause a cutting edge to produce a cut through when it traverses the reference distance across the material being tested.

3.1.6.1 *Discussion*—The rating force is the final result of this test method, the force required to produce a cut through in 20 mm of blade travel. A material with a higher rating force is considered to be more cut resistant.

3.2 *Additional Terminology*—Terms relevant to textiles are defined in D 123. Terms relevant to protective clothing are defined in F 1494.

4. Summary of Test Method

4.1 A cutting edge, with a specified load, is moved one time across a specimen mounted on a mandrel.

4.2 The distance is recorded, from initial contact to cut through, for each load.

4.2.1 A series of tests, at a minimum of three different loadings must be performed to establish a range and to determine the rating force.

4.3 The resulting load versus distance curve can be used to determine cut resistance of the specimen.

5. Significance and Use

5.1 This test method assesses the cut resistance of a material when exposed to a cutting edge under specified loads. Data obtained from this test method can be used to compare the cut resistance of different materials.

¹ This test method is under the jurisdiction of ASTM Committee F23 on Protective Clothing and is the direct responsibility of Subcommittee F23.20 on Physical Properties.

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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.