



Designation: D 6770 – 02

Standard Test Method for Abrasion Resistance of Textile Webbing (Hex Bar Method)¹

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1. Scope

1.1 This test method covers the determination of abrasion resistance of textile webbing using a hex bar abrasion tester.

1.1.1 The resistance is expressed as a percentage of retained break strength.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as the standard. Within the text, the inch-pound units are shown in parentheses. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with this test method.

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:

D 123 Terminology Relating to Textiles²

D 1776 Practice for Conditioning and Testing Textiles²

2.2 Other Standard:

Federal Standard 191, Method 4108 “Strength and Elongation, Breaking; Textile Webbing, Tape and Braided Items”³

3. Terminology

3.1 Definitions:

3.1.1 *abrasion, n*—the wearing away of any part of a material by rubbing against another surface.

3.1.2 *abrasion cycle, n*—one or more movements of an abradant across a material surface, or the material surface across the abradant, that permits a return to its starting position.

3.1.2.1 *Discussion*—The abrasion cycle is dependent on the programmed motions of the abrasion machine and the test standard used. It may consist of one back-and-forth unidirectional movement or one circular movement, or a combination

of both. For the hex bar abrasion method a cycle is comprised of two strokes.

3.1.3 *breaking force, n*—the maximum force applied to a material carried to rupture. (Compare *breaking point*, *breaking strength*.)

3.1.4 *standard atmosphere for preconditioning textiles, n*—a set of controlled conditions having a temperature not over 50°C (122°F), with respective tolerance of $\pm 1^\circ\text{C}$ (2°F), and a relative humidity of 5 to 25 $\pm 2\%$ for the selected humidity, so that drying can be achieved prior to conditioning in the standard atmosphere for testing textiles.

3.1.5 *standard atmosphere for testing textiles, n*—laboratory conditions for testing fibers, yarns, and fabrics in which air temperature and relative humidity are maintained at specific levels with established tolerances.

3.1.5.1 *Discussion*—Textile materials are used in a number of specific end-use applications that frequently require different testing temperatures and relative humidities. Specific conditioning and testing of textiles for end-product requirements can be carried out as defined in Practice D 1776.

3.1.6 *stroke, n*—in hex bar abrasion testing, one-half of an abrasion cycle that consists of one forward or one backward motion.

3.1.7 *webbing, n*—in textiles, a stout narrow fabric with a mass per unit area of at least 0.5 kg/m² (0.1 lb/ft²) for each 25.4 mm (1 in.) of width. (Compare *narrow fabric*, *ribbon*, and *tape*.)

3.2 For definitions of other textile terms used in this test method, refer to Terminology D 123.

4. Summary of Test Method

4.1 Abrasion resistance is measured by subjecting the specimen to unidirectional reciprocal rubbing over a specific bar under specified conditions of tension, stroke length and time. Resistance to abrasion is evaluated by determining the percent retention of breaking force of an abraded specimen compared to an unabraded specimen.

5. Significance and Use

5.1 The measurement of the resistance to abrasion of textile webbing is very complex. The resistance to abrasion is affected by many factors that include the inherent mechanical properties of the fibers; the dimensions of the fibers; the structure of the yarns; the construction of the webbing; the type, kind, and

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.60 on Fabrics, Specific.

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² *Annual Book of ASTM Standards*, Vol 07.01.

³ Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.