



Standard Test Method for Wet and Dry Yarn-on-Yarn Abrasion Resistance¹

This standard is issued under the fixed designation D 6611; 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 describes the measurement of abrasion resistance properties for manufactured fiber yarns in dry and wet conditions.

1.2 This test method applies to manufactured yarns used in rope making.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are provided for information only.

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 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 Textiles for Testing²

D 2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data²

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 *apex angle, n*—the angle formed between the incoming and outgoing yarn at the top (and bottom) of the interwrapped yarn area in the static condition (see Annex A1).

3.1.2.1 *Discussion*—In yarn abrasion testing, the state of a yarn, which has been soaked for a prescribed period of time in water before testing and then immersed in water during the abrasion test.

3.1.3 *applied tension, n*—in yarn abrasion testing, the static tension exerted on the weighted end of the yarn by the applied weight.

3.1.3.1 *Discussion*—Tension in the yarn varies along its length during each cycle because of friction and dynamic effects. The tension at any point in the interwrapped yarn

region and at any time may differ substantially from the applied tension but is a function of that applied tension.

3.1.4 *cycles to failure, CTF, n*—in yarn abrasion testing, the number of cycles applied to the yarn before it fails due to abrasion.

3.1.4.1 *Discussion*—Failure is considered to occur when the yarn is completely separated.

3.1.5 *dry, adj*—the state of a yarn which has not been exposed to excessive moisture.

3.1.6 *rope, n*—a compact and flexible, generally torsionally balanced continuous structure, greater than 4-mm ($\frac{3}{32}$ -in.) diameter, capable of applying or transmitting tension between two points.

3.1.7 *wet, adj*—the state of a yarn which has been exposed to excessive moisture.

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 A length of yarn is interwrapped in contact with itself between three pulleys that are positioned in a defined geometry to produce a specific intersection angle. A weight is attached to one end of the yarn to apply a prescribed tension. The other end is drawn back and forth through a defined stroke at a defined speed until the yarn fails due to abrasion upon itself within the interwrapped region. The yarn abrasion test can be conducted in either the dry state or the wet state.

5. Significance and Use

5.1 This test method is intended for testing dry and wet abrasion resistance of manufactured fiber yarns. This test method is especially useful for ropes intended for use in the marine environment. The test method has been used with yarns having linear densities ranging from 70 to 300 tex, but may be used with yarns outside these ranges.

5.2 Limited interlaboratory correlation testing has been conducted to date. Single-laboratory testing, in accordance with ASTM practices, has now been conducted. Additional interlaboratory testing, in accordance with ASTM practices, will be conducted after approval of a definitive test method. Test results should be used with caution pending completion of interlaboratory testing.

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.16 on Rope and Cordage.

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