



Designation: D3108/D3108M – 13 (Reapproved 2020)

Standard Test Method for Coefficient of Friction, Yarn to Solid Material¹

This standard is issued under the fixed designation D3108/D3108M; 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 kinetic frictional properties of a moving yarn in contact with a solid material.

NOTE 1—For determining yarn-to-yarn friction, refer to Test Method [D3412](#).

1.2 This test method specifies a relative speed of 100 m/min. The test method may be used at other speeds, although with a possible change in precision and coefficient of friction.

1.3 This test method covers the measurement of the coefficient of kinetic friction between yarn and solid surface or surfaces of constant radius in the contact area. If a yarn of uniform value is used, comparisons of frictional properties of different solid materials can be made with relation to that yarn. If a given solid material is used, comparisons of frictional properties of different yarns, or yarns with different finishes, can be made with relation to that particular solid material.

1.4 This test method specifically recommends wrap angles of 1.57, 3.14 and 6.28 radian (90, 180 and 360°), but other wrap angles may be used, again with a possible change in precision and level. The angle of wrap should not be so great, especially for yarns having high coefficients of friction, that it causes the output tension to exceed the yield value for the yarn being tested. Also, in every case the angle of wrap should not be less than 1.57 rad (90°).

1.5 This test method has been applied to yarns having linear densities ranging between 1.5 and 400 tex [14 and 3600 denier] and having coefficients of friction ranging between 0.1 and 1.0 but may also be used with yarns outside these ranges of linear densities and coefficients of friction.

1.6 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.7 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. Specific precautionary statements are given in Section 7.

1.8 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:²

[D123 Terminology Relating to Textiles](#)
[D1776 Practice for Conditioning and Testing Textiles](#)
[D1907 Test Method for Linear Density of Yarn \(Yarn Number\) by the Skein Method](#)
[D2258 Practice for Sampling Yarn for Testing](#)
[D3412 Test Method for Coefficient of Friction, Yarn to Yarn](#)
[D4849 Terminology Related to Yarns and Fibers](#)

3. Terminology

3.1 For all terminology relating to D13.58, Yarns and Fibers, refer to Terminology [D4849](#).

3.1.1 The following terms are relevant to this standard: coefficient of friction, friction, kinetic friction, radian, static friction, wrap angle.

3.2 For all other terminology related to textiles, refer to Terminology [D123](#).

4. Summary of Test Method

4.1 A length of yarn is run at known speeds and in contact with either single or multiple friction surfaces using a specified wrap angle. (See [Fig. 1](#).) The yarn input and output tensions are measured, and the coefficient of friction is calculated by means of Amontons' law (see [11.4](#)). Alternatively, apparatus is used in

¹ This test method is under the jurisdiction of ASTM Committee [D13](#) on Textiles and is the direct responsibility of Subcommittee [D13.58](#) on Yarns and Fibers.

Current edition approved Feb. 1, 2020. Published March 2020. Originally approved in 1972. Last previous edition approved in 2013 as D3108/D3108M – 13. DOI: 10.1520/D3108_D3108M-13R20.

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.