



Designation: G 143 – 96

Standard Test Method for Measurement of Web/Roller Friction Characteristics¹

This standard is issued under the fixed designation G 143; 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 can be used to simulate a roller/web transport tribosystem and to measure the static and kinetic coefficient of friction of the web/roller couple when sliding occurs between the two. The objective of this test method is to provide users with web/roller friction information that can be used for process control, design calculations, and for any other function where web/roller friction needs to be known.

1.2 *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 1894 Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting²

D 3108 Test Method for Coefficient of Friction, Yarn to Metal³

E 8 Test Methods for Tension Testing of Metallic Materials⁴

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process⁵

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁵

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁵

G 40 Terminology Relating to Erosion and Wear⁶

G 115 Guide for Measuring and Reporting Friction Coefficients⁶

G 117 Guide for Calculating and Reporting Measures of Precision Using Data from Interlaboratory Wear or Erosion Tests⁶

3. Terminology

3.1 Definitions:

3.1.1 *block, v —in plastics*, the tendency for one plastic surface to adhere to another surface (usually another plastic) after being in intimate contact for some residence time. Sometimes it takes hours, sometimes months.

3.1.2 *coefficient of friction, μ , n —in tribology*—the dimensionless ratio of the friction force (F) between two bodies to the normal force (N) pressing these bodies together.

3.1.3 *friction force, n* —the resisting force tangential to the interface between two bodies when, under the action of external force, one body moves or tends to move relative to the other.

3.1.4 *kinetic coefficient of friction, n* —the coefficient of friction under conditions of macroscopic relative motion between two bodies.

3.1.5 *stick-slip, n* —a cyclic fluctuation in the magnitudes of friction force and relative velocity between two elements in sliding contact, usually associated with a relaxation oscillation dependent on elasticity in the tribosystem and on a decrease of the coefficient of friction with onset of sliding or with increase of sliding velocity.

3.1.5.1 *Discussion*—Classical or true stick-slip, in which each cycle consists of a stage of actual stick followed by a stage of overshoot slip, requires that the kinetic coefficient is lower than the static coefficient. A modified form of relaxation oscillation, with near-harmonic fluctuation in motion, can occur when the kinetic coefficient of friction decreases gradually with increasing velocity within a certain velocity range. A third type of stick-slip can be due to spatial periodicity of the friction coefficient along the path of contact. Random variations in friction force measurement do not constitute stick-slip.

3.1.6 *triboelement, n* —one of two or more solid bodies which comprise a sliding, rolling, or abrasive contact, or a body subjected to impingement or cavitation.

3.1.6.1 *Discussion*—Contacting triboelements may be in direct contact, or may be separated by an intervening lubricant, oxide, or other film that affects tribological interactions between them.

¹ This test method is under the jurisdiction of ASTM Committee G-2 on Wear and Erosion and is the direct responsibility of Subcommittee G02.50 on Erosion. Current edition approved Oct. 10, 1996. Published December 1996.

² *Annual Book of ASTM Standards*, Vol 08.01.

³ *Annual Book of ASTM Standards*, Vol 07.01.

⁴ *Annual Book of ASTM Standards*, Vol 03.01.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ *Annual Book of ASTM Standards*, Vol 03.02.