



Designation: G 164 – 99 (Reapproved 2004)

Standard Test Method for Determination of Surface Lubrication on Flexible Webs¹

This standard is issued under the fixed designation G 164; 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 has been used since 1988 as an ANSI/ISO standard test for determination of lubrication on processed photographic films. Its purpose was to determine the presence of process-surviving lubricants on photographic films. It is the purpose of this test method to expand the applicability of this test method to other flexible webs that may need lubrication for suitable performance. This test measures the breakaway (static) coefficient of friction of a metal rider on the web by the inclined plane method. The objectives of the test is to determine if a web surface has a lubricant present or not. It is not intended to assign a friction coefficient to a material. It is not intended to rank lubricants.

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

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

G 40 Terminology Relating to Wear and Erosion

2.2 ANSI/ISO Standards:³

ANSI/ISO 5769-1984, ANSI/NAPM IT9.4-1992 for photography-Processed Films-Method for Determining Lubrication

3. Terminology

3.1 Definitions:

3.1.1 *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.

3.1.2 *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.

3.1.3 *static coefficient of friction, n* —the coefficient of friction corresponding to the maximum friction force that must be overcome to initiate macroscopic motion between two bodies.

3.1.4 *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.

3.1.5 *tribosystem, n* —any system that contains one or more triboelements, including all mechanical, chemical, and environmental factors relevant to tribological behavior.

3.1.6 *tribology, n* —the science and technology concerned with interacting surfaces in relative motion, including friction, lubrication, wear, and erosion.

3.1.7 *lubricant, n* —any substance interposed between two surfaces for the purpose of reducing the friction and wear between them.

4. Summary of Test Method

4.1 This test method can be used to measure the friction characteristics of the surfaces of a flexible web sliding against the curved smooth surface of a paper clip.

4.2 This test method is conducted on a narrow strip taken from a web of interest. The strip is affixed to an inclined plane device with the surface of interest facing up. A paper clip is balanced on the web surface with the inclined plane in the horizontal position. The plane is then angled upward until the rider breaks away.

4.3 The angle at which breakaway occurred is recorded. The tangent of that angle is the friction coefficient for that tribosystem.

5. Significance and Use

5.1 Many web materials do not convey satisfactorily in manufacture or work, or both, as intended in service unless their surface contains a very thin layer of lubricant in the form of a wax, particulate, thin film coating, or fluid. It is often very expensive and time consuming to use surface chemical analysis techniques to quantify the presence of these films. A simple friction test like this one performs this function.

5.2 This test has been used for over twenty years to detect the presence of lubricants on the surface of photographic films

¹ This test method is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.50 on Friction. Current edition approved Nov 1, 2004. Published November 2004. Originally approved in 1999. Last previous edition approved in 1999 as G 164 – 99¹.

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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.