



Standard Test Method for Galling Resistance of Material Couples¹

This standard is issued under the fixed designation G196; 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 a laboratory test that ranks the galling resistance of material couples using a quantitative measure. Bare metals, alloys, nonmetallic materials, coatings, and surface modified materials may be evaluated by this test method.

1.2 This test method is not designed for evaluating the galling resistance of material couples sliding under lubricated conditions, because galling usually will not occur under lubricated sliding conditions using this test method.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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:*²

G40 Terminology Relating to Wear and Erosion

G98 Test Method for Galling Resistance of Materials

3. Terminology

3.1 Definitions used in this test method given in Terminology G40.

3.2 *Definitions:*

3.2.1 *apparent area of contact*—area of contact between two solid surfaces defined by the boundaries of their macroscopic interface.

3.2.2 *galling*—form of surface damage arising between sliding solids, distinguished by macroscopic, usually localized,

roughening and creation of protrusions above the original surface; it often includes plastic flow or material transfer, or both.

3.2.3 *triboelement*—one of two or more solid bodies that comprise a sliding, rolling, or abrasive contact, or a body subjected to impingement or cavitation. (Each triboelement contains one or more tribosurfaces.)

3.2.4 *tribosurfaces*—any surface (of a solid body) that is in moving contact with another surface or is subjected to impingement or cavitation.

3.2.5 *tribosystem*—any system that contains one or more triboelements, including all mechanical, chemical, and environmental factors relevant to the tribological behavior. (See also triboelement.)

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *galling₅₀*—stress at which the probability of galling occurring on one or both of the test specimens is 50%.

4. Summary of Test Method

4.1 This test method uses available laboratory equipment capable of maintaining a constant, compressive load between two flat specimens, such as hydraulic compression testing machines. One specimen is slowly rotated one complete revolution relative to the other specimen. The surfaces are examined for galling after sliding. The criterion for whether galling occurs is the appearance of the specimens based on unassisted visual examination.

4.2 Appropriate load intervals are chosen to determine the threshold galling stress within an acceptable range.

4.3 The higher the Galling₅₀ value, the more galling resistant is the test couple.

5. Significance and Use

5.1 This test method is designed to rank material couples in their resistance to the failure mode caused by galling and not merely to classify the surface appearance of sliding surfaces.

5.2 This test method has been shown to have higher repeatability than Test Method G98 in determining the galling resistance. Test Method G98 can be used for initial ranking of galling resistance.

¹ This test method is under the jurisdiction of ASTM Committee G02 on Wear and Erosion and is the direct responsibility of Subcommittee G02.40 on Non-Abrasive Wear.

Current edition approved Nov. 1, 2016. Published November 2016. Originally approved in 2008. Last previous edition approved in 2008 as G196 – 08. DOI: 10.1520/G0196-08R16.

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.