



Standard Test Method for Damage to Contacting Solid Surfaces under Fretting Conditions¹

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INTRODUCTION

Fretting is small amplitude oscillating motion usually in the range of 10 to 300 μm . Contacting solid surfaces subjected to this type of motion can develop significant damage in the form of mass loss, pitting, debris generation, etc. Frequently, pitting damage caused by fretting creates stress concentrations that contribute to mechanical failures. Most material couples are susceptible to fretting damage and this test method is intended to assess a tribocouple's relative susceptibility to damage under fretting conditions.

When tribocouples experience oscillating relative motion less than about 10 μm , gross slip (all points in a contact experience relative slip over a complete cycle) may not occur. The elastic behavior of the real contacts may accommodate this motion and fretting damage may not occur.

When metal couples are subjected to fretting motion, there is a potential for chemical reaction with the ambient environment to be a component of the damage. In metals rubbing in air, oxidation of freshly fractured surfaces can occur. When chemical reaction is conjoint with the mechanical damage produced by fretting, it is called fretting corrosion. When most plastic couples are damaged by fretting motion, the fractured surfaces may not react with the environment and fretting wear occurs as opposed to fretting corrosion.

1. Scope

1.1 This test method covers the studying or ranking the susceptibility of candidate materials to fretting corrosion or fretting wear for the purposes of material selection for applications where fretting corrosion or fretting wear can limit serviceability.

1.2 This test method uses a tribological bench test apparatus with a mechanism or device that will produce the necessary relative motion between a contacting hemispherical rider and a flat counterface. The rider is pressed against the flat counterface with a loading mass. The test method is intended for use in room temperature air, but future editions could include fretting in the presence of lubricants or other environments.

1.3 The purpose of this test method is to rub two solid surfaces together under controlled fretting conditions and to quantify the damage to both surfaces in units of volume loss for the test method.

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

1.5 *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

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

G40 Terminology Relating to Wear and Erosion

G99 Test Method for Wear Testing with a Pin-on-Disk Apparatus

G117 Guide for Calculating and Reporting Measures of

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.

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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.