



Standard Test Method for Endurance (Wear) Life and Load-Carrying Capacity of Solid Film Lubricants (Falex Pin and Vee Method)¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method² covers the determination of the endurance (wear) life and load-carrying capacity of dry solid film lubricants in sliding steel-on-steel applications.

1.2 The values stated in SI units are to be regarded as the standard except where equipment is supplied using inch-pound units and would then be regarded as standard. The metric equivalents of inch-pound units given in such cases in the body of the standard may be approximate.

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:

B 16 Specification for Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines³

F 22 Test Method for Hydrophobic Surface Films by the Water-Break Test⁴

2.2 U.S. Military Specifications:⁵

MIL-P-16232F Phosphate Coatings, Heavy, Manganese or Zinc Base (for Ferrous Metals)

MIL-L-8937

2.3 Other Standards:⁶

42USC7671a Clean Air Act Amendments of 1990

Federal Test Methods 791a, Methods 3807 and 3812.

3. Terminology

3.1 Definition:

3.1.1 *dry solid film lubricants*—dry coatings consisting of lubricating powders in a solid matrix bonded to one or both surfaces to be lubricated.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *endurance (wear) life*—the length of test time before failure under a constant loaded condition, in minutes, in which the applied test lubricant performs its function.

3.2.2 *load carrying capacity*—the highest indicated load sustained for a minimum of 1 min.

3.2.3 *gage load, n*—the value obtained from the gage while running the test after being corrected to the standard curve using the calibration procedure for the 4500-lbf (20 000-N) reference gage.

3.2.3.1 *Discussion*—The gage reading is irrespective of the particular gage used, and corrections are made by comparison to the Brinell ball impression diameters on a standard reference copper test coupon with a Rockwell hardness range of HB 37 to HB 39. An electronic calibration instrument⁷ is available which can be used in place of the copper coupon.

3.2.4 *direct load, n*—the load that is applied linearly, bisecting the angle of the vee block corrected to either the 800-lbf (3550-N) gage reference or the 3000-lbf (13 300-N) gage reference.

3.2.4.1 *Discussion*—This load is equivalent to the true load times the cos 42°.

4. Summary of Test Method

4.1 The endurance test (Procedure A) consists of running two stationary steel vee block specimens loaded to a predetermined value against a rotating steel pin specimen. The endurance (wear) life is determined when the torque increases by 10 in·lbf (1.13 N·m).

4.2 The load-carrying capacity test (Procedure B) consists of running two stationary steel vee block specimens against a rotating steel pin, increasing the load on the pin until a sharp

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² Reference may be made to Coordinating Research Council, Inc. (CRC) Report No. 419, "Development of Research Technique for Measuring Wear Life of Bonded Solid Lubricant Coatings for Airframes, Using the Falex Tester." Also to Military Specification MIL-L-8937 (ASG), Jan. 22, 1963, and Methods 3807 and 3812 of Federal Test Method Standard No. 791a.

³ *Annual Book of ASTM Standards*, Vol 02.01.

⁴ *Annual Book of ASTM Standards*, Vol 15.03.

⁵ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁶ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁷ The Falex Pin and Vee Block Test machine available from Falex Corp., 1020 Airpark Dr., Sugar Grove, IL 60554 has been found satisfactory for this purpose. A new model of this machine has been available since 1983. Certain operating procedures are different for this new model. Consult instruction manual of machine for this information.