



Designation: D 2877 - 70



Designation: 283/72T



Standard Method for

MEASURING FRICTIONAL PROPERTIES OF SLIDEWAY LUBRICANTS¹

This Standard is issued under the fixed designation D 2877; 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.

1. Scope

1.1 This method² describes a procedure for making an evaluation of the antifriction characteristics of lubricating oils used on machine tool slideway bearings by means of a stick-slip apparatus.

NOTE 1—The values stated in U.S. customary units are to be regarded as standard.

2. Summary of Method

2.1 The test consists of slowly traversing a base block beneath a top block under a 49.5-lb (22.45-kg) total load with the oil sample between the blocks. Deflection resulting from kinetic thrust force is observed while the block is moving from right to left and from left to right. Deflection resulting from static thrust force is observed after this movement is terminated. The magnitude of deflection is determined by dial indicators mounted on the apparatus. From the deflection readings, the static coefficient of friction (U_s), kinetic coefficient of friction (U_k) and stick-slip number (U_s/U_k) are calculated.

NOTE 2—The static friction measured is not the usual breakaway force, but is the motion-resisting force 1 min after the motor is turned off.

3. Significance

3.1 The stick-slip test is used to determine the frictional characteristics of slideway oils. Results obtained by the test method described have been found to correlate closely with the performance of lubricants on slides operating at speeds of less than 6 in. (152.4 mm)/min. In this test, a high stick-slip number, or

sliding with stick-slip action, implies poor performance in slideways.

4. Apparatus

4.1 *Stick-Slip Machine*,³ as shown in Fig. 1 or 2.

5. Materials

5.1 *Set of Test Blocks*, schematically shown in Fig. 3. Materials, manufacturing procedure, and break-in procedure are covered in Appendix A1.

5.2 *Oil*, with known stick-slip number.

NOTE 3—Fluid TDL-XI-5-1 or TDL-XI-5-2, used in cooperative testing covered in Table A1, is suitable.

5.3 *Alcohol*, denatured, conforming to Formula 30 or 3A of the U.S. Bureau of Internal Revenue.

5.4 *Chlorothene (1,1,1-Trichloroethane)*, industrial grade.

5.5 *Lintless Tissue* or absorbent cotton.

5.6 *Medicine Dropper*.

5.7 *Timer*, graduated in seconds.

¹ This method is under the jurisdiction of ASTM Committee D-2 Petroleum Products and Lubricants.

Effective Sept. 11, 1970.

² Merchant, M. E., "Characteristics of Typical Polar and Non-Polar Lubricant Additives Under Stick-Slip Conditions," *Lubrication Engineering*, LUENA, Vol 2, No. 2, June, 1946, pp. 56-61.

³ Test machines manufactured by Cincinnati Milling Machine Co., Cincinnati, Ohio (Method A), and by Laboratory Equipment Corp., Mooresville, Ind. (Method B), have been found satisfactory for this purpose.