



Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester¹

This standard is issued under the fixed designation E303; 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 the procedure for measuring surface frictional properties using the British Pendulum Skid Resistance Tester.² A method for calibration of the tester is included in the Annex.

1.2 The British Pendulum Tester is a dynamic pendulum impact-type tester used to measure the energy loss when a rubber slider edge is propelled over a test surface. The tester is suited for laboratory as well as field tests on flat surfaces, and for polish value measurements on curved laboratory specimens from accelerated polishing-wheel tests.

1.3 The values measured, BPN = British Pendulum (Tester) Number for flat surfaces and polish values for accelerated polishing-wheel specimens, represent the frictional properties obtained with the apparatus and the procedures stated herein and do not necessarily agree or correlate with other slipperiness measuring equipment.

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

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

E501 Specification for Rib Tire for Pavement Skid-Resistance Tests

¹ This test method is under the jurisdiction of ASTM Committee E17 on Vehicle - Pavement Systems and is the direct responsibility of Subcommittee E17.23 on Surface Characteristics Related to Tire Pavement Slip Resistance.

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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.

3. Summary of Test Method

3.1 This test method consists of using a pendulum-type tester with a standard rubber slider to determine the frictional properties of a test surface.

3.2 The test surface is cleaned and thoroughly wetted prior to testing.

3.3 The pendulum slider is positioned to barely come in contact with the test surface prior to conducting the test. The pendulum is raised to a locked position, then released, thus allowing the slider to make contact with the test surface.

3.4 A drag pointer indicates the British Pendulum (Tester) Number. The greater the friction between the slider and the test surface, the more the swing is retarded, and the larger the BPN reading. Four swings of the pendulum are made for each test surface.

4. Significance and Use

4.1 This test method provides a measure of a frictional property, microtexture, of surfaces, either in the field or in the laboratory.

4.2 This test method may be used to determine the relative effects of various polishing processes on materials or material combinations.

4.3 The values measured in accordance with this method do not necessarily agree or directly correlate with those obtained utilizing other methods of determining friction properties or skid resistance.

NOTE 1—BPN and polish values from similar types of surfaces will not be numerically equal, primarily because of the differences in slide length and surface shape. Theoretical correction of the polish values to obtain numerical equality, either by mathematical manipulation or by use of special measuring scales is not recommended.

5. Apparatus

5.1 *British Pendulum Tester* (Fig. 1)—The pendulum with slider and slider mount shall weigh 1500 ± 30 g. The distance of the center of gravity of the pendulum from the center of oscillation shall be 411 ± 5 mm (16.2 ± 0.2 in.). The tester shall be capable of vertical adjustment to provide a slider contact path of 125 ± 1.6 mm ($4\frac{1}{8} \pm \frac{1}{16}$ in.) for tests on flat surfaces, and 76 to 78 mm ($3 \pm \frac{1}{16}$ in.) for tests on

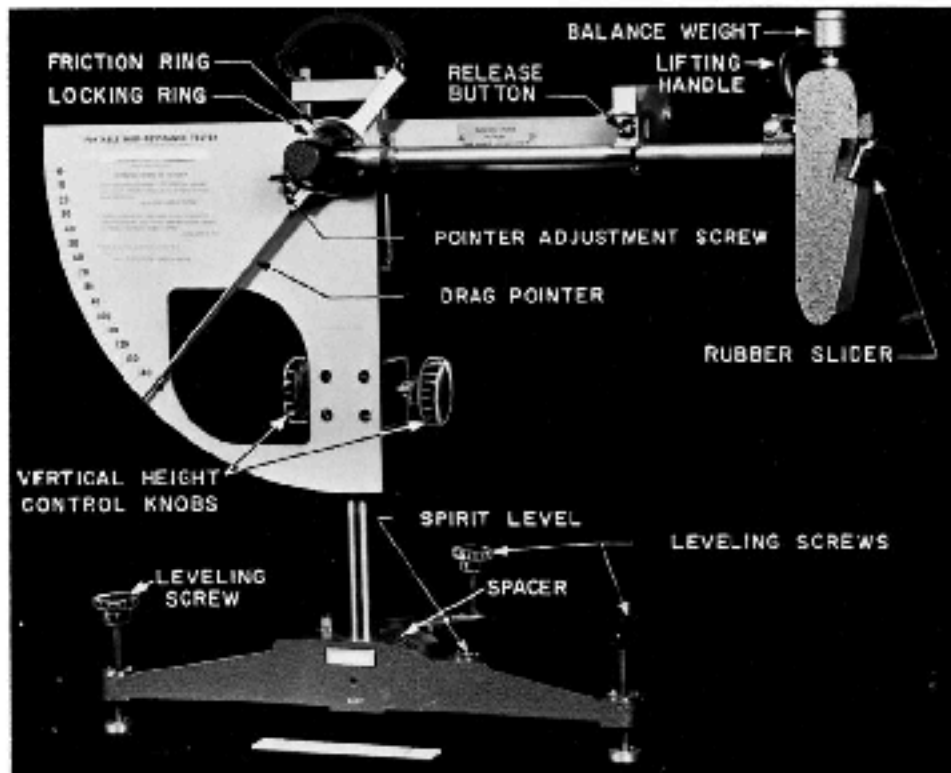


FIG. 1 British Pendulum Tester

polishing-wheel specimens. The spring and lever arrangement shown in Fig. 2 shall give an average normal slider load between the 76-mm (3-in.) wide slider and test surface of 2500 ± 100 g as measured by the method prescribed in the annex.

5.2 *Slider*—The slider assembly shall consist of an aluminum backing plate to which is bonded a 6 by 25 by 76-mm ($\frac{1}{4}$ by 1 by 3-in.) rubber strip for testing flat surfaces or a 6 by 25 by 32 mm ($\frac{1}{4}$ by 1 by 1 $\frac{1}{4}$ -in.) rubber strip for testing curved polishing-wheel specimens. The rubber compound shall be natural rubber meeting the requirements of the Road Research Laboratory³ or synthetic rubber as specified in Specification E501.

5.2.1 New sliders shall be conditioned prior to use by making ten swings on No. 60 grade silicon carbide cloth⁴ or equivalent under dry conditions. The swings shall be made with a tester adjusted as in Section 7.

³ Giles, C. G. Sabey, Barbara E., and Carden, K. W. F., "Development and Performance of Portable Skid-Resistance Tester," *Royal Research Technical Paper No. 66*, Road Research Laboratory, Dept. of Scientific and Industrial Research, England, 1964.

Kummer, H. W. and Moore, D. F., "Concept and Use of the British Portable Skid-Resistance Tester," *Report No. 6*, PDH-PSV Joint Road Friction Program, Dept. of Mechanical Engineering, The Pennsylvania State University, State College, PA, 16802, June 1963.

⁴ The sole source of supply of the apparatus known to the committee at this time is available from 3 M Co., St. Paul, MN, under the trade name of Type B Safety-Walk. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

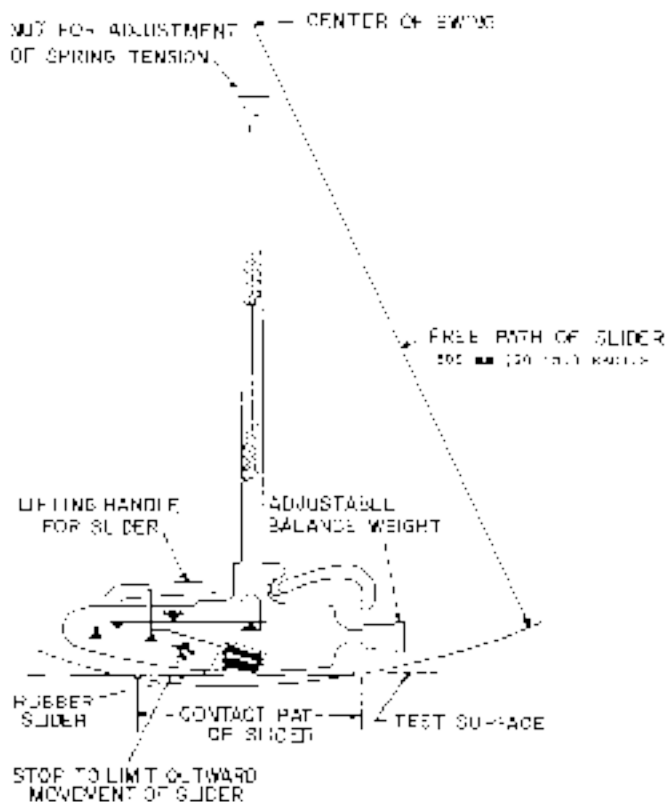


FIG. 2 Schematic Drawing of Pendulum Showing Spring and Lever Arrangement