



Designation: D2639/D2639M – 23

Standard Test Method for Plastic Properties of Coal by the Constant-Torque Gieseler Plastometer¹

This standard is issued under the fixed designation D2639/D2639M; 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 relative measure of the plastic behavior of coal when heated under prescribed conditions. This test method may be used to obtain semiquantitative values of the plastic properties of coals and blends used in carbonization and in other situations where determination of plastic behavior of coals is of practical importance.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3 In this test method, the term “mass” applies to measurements expressed with both SI units (for example, kg) and inch-pound units (for example, lb).

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D2013/D2013M Practice for Preparing Coal Samples for Analysis

¹ This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.15 on Metallurgical Properties of Coal and Coke.

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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.

D2234/D2234M Practice for Collection of a Gross Sample of Coal

3. Terminology

3.1 Definitions:

3.1.1 *breaking*, v —free spinning behavior of coal, either by an abrupt change to rotating at maximum motor speed or by abrupt changes in rotation, which occurs as a result of a molten ball of coal forming around the base of the stirrer, and which makes reporting of the true maximum fluidity of the coal difficult.

3.1.2 *dial division per minute, (DDPM), n* —as used in this test method, the stirrer rotation rate as measured by the accumulated rotations (full or partial) of the stirrer recorded over sequential 1 min periods based upon 100 dial divisions for each complete 360° rotation of the stirrer.

3.1.2.1 *Discussion*—Historically stirrer rotations were recorded on manual plastometers by a simple timed observation of the total rotations at the completion of each sequential whole minute interval as the furnace was ramped over the required temperature range. Modern instruments have the ability to record the accumulated stirrer rotations at any given point during the test and as such can present the DDPM over any discrete 60 s interval. For the purposes of this empirical standard and in order to ensure consistency between instrumentation, the recorded DDPM shall be taken at the end of each sequential minute interval commencing at the start of the test and ending with the recorded solidification temperature. That is to say, upon regaining the initial temperature of 300 °C, total accumulated stirrer rotations shall be recorded at times 00:01:00, 00:02:00, 00:03:00, 00:04:00, etc. until the solidification temperature is reached.

3.1.3 *initial softening temperature, n* —as used in this test method, the temperature at which the DDPM (see 3.1.2) first reaches a reading of equal to or greater than 1.0.

3.1.4 *jamming*, v —swelling up of coal into the retort tube during the test, which may produce lower fluidity results than expected and can only be noted after visual inspection of the disassembled crucible and retort at the conclusion of the test.

3.1.5 *maximum fluidity, n* —as used in this test method, the measured maximum stirrer rotation rate, in dial divisions per minute.