



Designation: ~~D3997/D3997M – 97 (Reapproved 2009)~~ D3997/D3997M – 16

Standard Practice for Preparing Coke Samples for Microscopical Analysis by Reflected Light¹

This standard is issued under the fixed designation D3997/D3997M; 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 practice covers laboratory procedures for the preparation of granular samples of coke and lump coke into briquette and block samples for examination with a reflected light microscope. The samples prepared are used for identifying examination and quantifying identification of the textural components in coke. ~~This practice does not apply to the preparation components in coke and the measurement of the reflectance of coke.~~

NOTE 1—Sieve size is identified by its standard designation in Specification E11. The alternative designation given in parentheses is for information only and does not represent a different standard sieve size of oriented lump specimens of coke for structural analysis.

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 may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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:*²

[D121 Terminology of Coal and Coke](#)

[D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis](#)

[D5061 Test Method for Microscopical Determination of the Textural Components of Metallurgical Coke](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

3. Terminology

3.1 *Definitions:*

3.1.1 For additional definitions of terms used in this practice, refer to Terminology [D121](#).

3.1.2 *block, n*—piece of sectioned lump coke or coke drillcore embedded in sample binder.

3.1.3 *briquette, n*—a cylindrical block composed of granulated coal or coke particles compressed and embedded with an epoxy binder.

4. Summary of Practice

4.1 A representative sample is crushed to a specified particle size, ~~oven-dried, oven-dried or after air-drying,~~ mixed with a binder, and formed into a block specimen referred to as a briquette. ~~The briquette is then polished to a flat, scratch-free surface for microscopical examination under reflected light.~~ “briquette.”

4.2 Alternatively, a sectioned lump of coke, or coke drill core, oven-dried or after air-drying, is embedded in a suitable binder and formed into a block specimen referred to as a “block.”

4.3 The briquette or block is then polished to a flat, scratch-free surface for microscopical examination under reflected light.

¹ This practice is under the jurisdiction of ASTM Committee [D05](#) on Coal and Coke and is the direct responsibility of Subcommittee [D05.28](#) on Petrographic Analysis of Coal and Coke.

Current edition approved ~~Sept. 1, 2009~~ Oct. 1, 2016. Published ~~March 2010~~ October 2016. Originally approved in 1992. Last previous edition approved in ~~2004~~ 2009 as D3997 – 97(2004);(2009). DOI: ~~10.1520/D3997-D3997M-97R09~~ 10.1520/D3997_D3997M-16.

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.

5. Significance and Use

5.1 Briquettes and blocks of granular coke prepared in accordance with the laboratory procedures of this practice will have flat, scratch-free surfaces suitable for examination with a microscope using reflected light illumination. The polished surface of briquettes—the samples prepared using this practice will contain particles representative of the original gross sample. Polished blocks of coke will preserve the porosity and undisturbed distributions of carbon forms required in the production of sequences of stitched and tiled image mosaics. Such images are required for microscopic porosity measurement.

5.2 Samples prepared by this practice are used for microscopical determination of the textural components in coke (see Test Method D5061) and the measurement of coke reflectance.

6. Apparatus

6.1 Grinder, Pulverizer, Mill, or Jaw Crusher, or other suitable equipment for final crushing of the sample to pass a 2.36-mm (No. 8) sieve—U.S. Standard Sieve.

6.2 Coarse Riffle Sampler, with at least twelve divisions of not less than 12.7 mm [1/2 in.] and not greater than 19.1 mm [3/4 in.].

6.3 Medium Riffle Sampler, with at least twelve divisions of not less than 6.4 mm [1/4 in.] and not greater than 12.7 mm [1/2 in.].

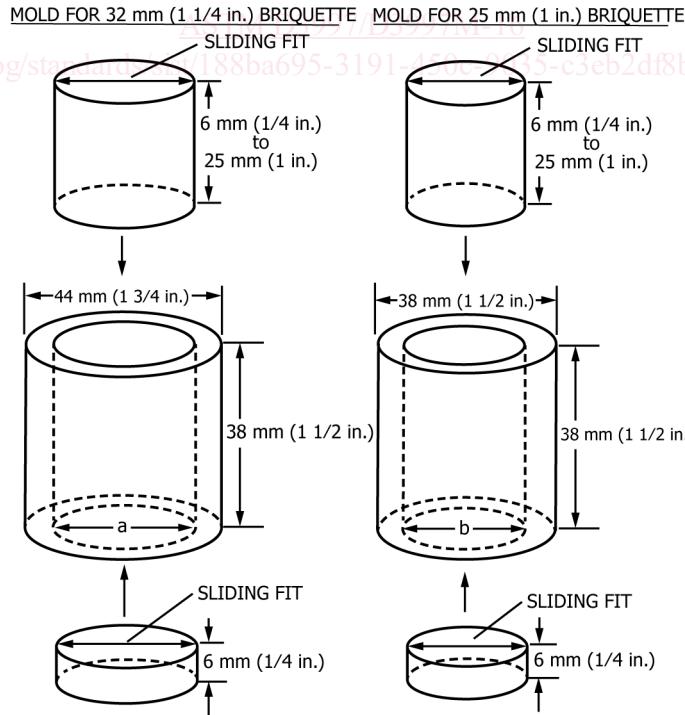
6.4 Circular Sample Saw, with a diamond blade at least 240 mm [10 in.] in diameter, capable of cutting a large piece of coke perpendicular to growth lines in one pass.

6.5 Drill Press, with a hollow diamond drill bit with an internal diameter capable of producing cored samples of coke, perpendicular to growth lines.

6.6 Sieves—A 6.4 mm [1/4 in.] and 2.36 mm (No. 8) U.S. Standard Sieve (see Specification E11).

6.7 Molds—Containers to hold the coke/binder mixture while the binder hardens. Generally, steel cylindrical molds are used. These may be steel cylindrical molds, or reusable plastic or silicone-rubber molds (see Fig. 1). However, it is acceptable to use other mold materials that successfully yield the same type of briquette. Molds made of other materials are acceptable, providing that briquettes and blocks can be successfully polished.

6.7.1 The mold shall be made of separable parts or some other design so designed that the briquette or block can be ejected after the briquette or block has hardened.



NOTE 1—Material: cold rolled or stainless steel. Dimensions a and b (inside diameters) are nominally 32 and 25 mm. If an automatic polishing attachment is to be used, these dimensions should be specified to yield a briquette fitting snugly in the briquette holder.

FIG. 1 Molds Suitable for Briquetting Coke Samples