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Standard Practice for Collection and Preparation of Coke Samples for Laboratory Analysis¹

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INTRODUCTION

Coke, especially run of oven coke or foundry coke, or both, is a difficult material to sample. It is imperative that every sample be collected and handled carefully and conscientiously and in strict accordance with the standard procedure described herein.

Gross samples of not less than the quantities designated in this practice must be taken, whether the coke to be sampled consists of a few tons or several hundred tons.

1. Scope

1.1 This practice covers procedures for the collection and reduction of samples of coke to be used for physical tests, chemical analyses, and the determination of total moisture.

1.2 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.

1.2.1 Values in SI units [or inch-pound units] shall be obtained by measurement in SI units [or inch-pound units] or by appropriate conversion, using the Rules for Conversion and Rounding given in [IEEE/ASTM SI 10](#), of measurements made in other units [or SI units]. Values are stated in SI units when inch-pound units are not used in practice.

1.3 *This standard does not purport to address the safety concerns 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

¹ This practice is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.23 on Sampling.

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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.

[D167 Test Method for Apparent and True Specific Gravity and Porosity of Lump Coke](#)
[D293 Test Method for the Sieve Analysis of Coke](#)
[D2013 Practice for Preparing Coal Samples for Analysis](#)
[D2234/D2234M Practice for Collection of a Gross Sample of Coal](#)
[D3038 Test Method for Drop Shatter Test for Coke](#)
[D3302 Test Method for Total Moisture in Coal](#)
[D3402 Test Method for Tumbler Test for Coke](#)
[IEEE/ASTM SI 10 American National Standard for Metric Practice](#)

3. Significance and Use

3.1 This practice may be used to provide a representative sample of the coke from which it is collected. Because of the variability of coke and the wide variety of sampling equipment, caution must be exercised in all stages of sampling, from system specifications and equipment procurement to equipment acceptance testing and actually taking the final sample.

3.2 This practice also provides an analysis sample of coke from the gross or divided sample. The analysis samples can be used to determine the value of the coke represented, its ability to meet specifications, as well as for other purposes.

4. Place of Sampling

4.1 Sample coke while it is being loaded into or unloaded from railroad cars, ships, barges, or trucks, or when discharged from supply bins, grab buckets, belt conveyers, or other coke conveying equipment. Sample close to the point of interest.

5. Collection of Gross Sample

5.1 Collect increments regularly, systematically, and with such frequency, so that the entire quantity of coke sampled will be represented proportionately in the gross sample, and a gross

sample of the required amount will be collected. The standard gross sample shall equal or exceed the quantities given in **Table 1**.

5.1.1 The quantity of sample to be taken will depend on the type and size of the coke being sampled and the amount of information to be obtained from the sample.

5.1.1.1 The size of the sieve analysis sample is governed by the homogeneity of the coke being sampled. The quantities given in **Table 1** represent the minimum quantity to be collected. The sieve analysis sample will supply sufficient coke for any subsequent physical tests and laboratory analysis. Total moisture of the coke should not be determined on the sieve analysis sample.

5.1.1.2 For the drop shatter test, a minimum of 75 kg [165 lb] of coke retained on 50-mm [2-in.] square mesh sieve if furnace coke is being processed, or 140 kg [300 lb] of coke retained on 75-mm [3-in.] square mesh sieve if foundry coke is being processed, is required. The quantities given in **Table 1** represent the minimum amounts required of sized coke.

5.1.1.3 The tumbler test requires a minimum of 35 kg [75 lb] of coke that will pass a 75-mm [3-in.] square mesh sieve and can be retained on a 50-mm [2-in.] square mesh sieve, or that which will pass a 64-mm [2½-in.] square mesh sieve and can be retained on a 38-mm [1½-in.] square mesh sieve. The quantities given in **Table 1** represent the minimum amount of the required sized coke.

5.1.1.4 The apparent specific gravity test required a minimum of 23 kg [50 lb] of representative coke pieces. The quantities given in **Table 1** represent the minimum amounts of the required coke pieces.

5.1.1.5 The determination of total moisture of the coke requires approximately 45 kg [100 lb] of coke. The quantities given in **Table 1** represent the minimum amount to be collected.

5.1.1.6 The quantities given for samples for chemical analysis represent the minimum amounts to be collected.

NOTE 1—Samples collected from the surface of coke in piles, bins, cars, ships, or barges are, in general, unreliable because of size segregation and should not be used for determining conformance to specifications unless the purchaser and the seller so agree. If necessary to collect a sample of coke from the surface of a loaded railroad car, take nine equal increments about 305 mm [1 ft] below the surface. Locate the nine points as shown in **Fig. 1**. The diameter of the hole must be at least 3 times that of the largest piece in the shipment.

6. Condition of Increment Collection

6.1 Four conditions of increment collection are recognized:

6.1.1 *Condition A (Stopped-Belt Cut)*, in which a loaded conveyor belt is stopped and a full cross-section cut with parallel sides is removed from the coke stream. The distance between the parallel faces shall not be less than three times the length of the largest piece.

6.1.2 *Condition B (Full-Stream Cut)*, in which a full cross section is removed from a moving stream of coke.

6.1.3 *Condition C (Part-Stream Cut)*, in which a portion, not a full cross section, is removed from a moving stream of coke.

6.1.4 *Condition D (Stationary Sampling)*, in which a portion of coke is collected from a pile, a railroad car, a barge, or a shiphold.

NOTE 2—See Section 6 of Practice **D2234/D2234M**.

7. Size of Increments

7.1 To collect increments, use a shovel or specially designed tool or mechanical means for taking equal increments. When increments are collected from the surface of a loaded rail car or truck shipment, the gross sample shall consist of nine increments of approximately equal quantity. When increments are taken from piles, conveyor belts, barges, and so forth, the gross sample shall consist of not less than 25, nor more than 50 increments, of approximately equal quantity.

NOTE 3—When large-size coke, such as foundry coke, is being sampled, it is likely that quantities larger than those given in **Table 1** will be collected. However, the minimum number of increments collected should not be decreased unless such is agreed upon between the purchaser and the seller.

NOTE 4—If the sample for chemical analysis is obtained from the sieve analysis sample, a sample not smaller than that shown in **Table 1** should be reconstituted from the size fractions obtained when the sieve analysis sample was processed.

8. Quantities Represented

8.1 Take a gross sample for each 454 Mg [500 tons] or fraction thereof, or in case of larger tonnages, for such quantities as may be agreed upon. Sample separately each lot of coke arising from a different source or known to be of different quality or size.

9. Processing of the Test Sample

9.1 Process samples collected for sieve analysis of coke in accordance with the procedure given in Test Method **D293**.

9.2 Process samples collected for the drop shatter test in accordance with the procedure given in Test Method **D3038**.

TABLE 1 Minimum Gross Sample Weights of Coke, kg [lb]

Usage	Foundry Coke		Furnace Coke		Coke Breeze ^A
	Run of Oven	Sized	Run of Oven	Sized	
Sieve analysis (size consist)	364 [800]	227 [500]	227 [500]	182 [400]	45 [100]
Drop shatter test	182 [400]	159 [350]	136 [300]	91 [200]	...
Tumbler test	68 [150]	45 [100]	57 [125]	57 [125]	...
Apparent specific gravity	46 [100]	46 [100]	46 [100]	46 [100]	23 [50]
Coke moisture	46 [100]	46 [100]	46 [100]	46 [100]	23 [50]
Chemical analysis	113 [250]	113 [250]	57 [125]	57 [125]	34 [75]

^A Coke passing a 19-mm [¾-in.] square hole sieve or smaller top size.