Designation: D 6610 – 01

Standard Practice for Manual Sampling of Coal from Stockpiles[1]

This standard is issued under the fixed designation D 6610; 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 procedures for obtaining a manual gross sample from the surface[2] of coal stockpiles. These procedures are used to provide gross samples for general laboratory analysis and for estimating quality and total moisture. The gross sample is to be crushed and further prepared for analysis in accordance with Method D 2013. Mechanical equipment such as auger samplers and core drill rigs are addressed by other guides (D 4916) or working papers.

1.2 The user is cautioned that samples of this type do not satisfy the minimum requirements for probability sampling and as such cannot be used to draw statistical inferences about the precision, standard error, or bias.

1.3 This sampling method is intended for use only when sampling by more reliable methods that provide a probability sample is not possible.

1.4 The quantities stated in either acceptable SI units or in inch-pound units are regarded separately as standard. The quantities stated in each system may not be exact equivalents; therefore, each system must be used independently of the other, without combining quantities in any way.

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:*

D 2013 Method of Preparing Coal Samples for Analysis[3]

D 2234 Practice for Collection of a Gross Sample of Coal[3]

D 4749 Test Method for Performing Sieve Analysis of Coal and Designating Coal Size[3]

D 4916 Guide for Mechanical Auger Sampling[3]

E 105 Practice for Probability Sampling of Materials[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *particle size segregation, n*—the segregation of sized particles to specific areas as a result of the particles rolling, falling, or sliding down the sides of a pile or a result of the peculiarities of a coal handling system used to build the pile.

3.1.2 *stockpile, n*—material stored or reserved in a stacked pile or heap.

4. Summary of Practice

4.1 This practice is limited to manual collection of sample increments of coal from the surface layer(s) of a coal stockpile for the purpose of acquiring a gross sample.

5. Significance and Use

5.1 The guidelines, cautions, and suggested procedures presented here are intended to provide uniform methods for collection of manual samples from the surface layer(s) of coal stored in a stockpile, taking into account the wide variety of conditions that may be encountered.

5.2 These guidelines provide procedures for collecting gross samples from the surface layers of coal in a stockpile; these samples then being further processed to provide samples for required laboratory estimations. The use of this practice is conditional upon agreement among all interested parties concerning all relevant details of sample collection before sampling begins. These include, but are not limited to: lot size; number and mass of increments; the size, shape, and manipulation of the increment collection devices; location of increment collection site or sites; circumstances under which increments are not to be collected or suspended; and safety precautions. It is preferable that such agreements be in writing. This practice provides instructions for sampling only the outer layers of coal contained in a stockpile. The user is cautioned that samples so obtained do not represent material below the point of penetration.

6. Procedure

6.1 *Lot Size*—All interested parties should agree to the size

[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] Although reference is made to collecting sample increments from the surface of the coal stockpile, in reality the increments are collected from coal approximately 18 in. (46 cm) below the exposed surface of the pile.

[3] *Annual Book of ASTM Standards*, Vol 05.06.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

of the lot to be represented by one gross sample before sampling begins.

6.2 *Inspection*—Before sampling a lot of coal using this method, a visual inspection for size distribution and possible size segregation within the stockpile should be performed. Notes should be made on the sampling log to reflect these observations. These notes could be useful in understanding differences of analytical test results or in identifying changes in stockpiling characteristics. Test Method D 4749 may be used to determine the top size of the surface layer of coal being sampled.

6.2.1 For the purposes of uniformity, it is recommended that Table 1 be used to establish minimum weight of increments. The top size of the coal and lot size to be represented by each gross sample must be ascertained if Table 1 is to be used to determine the minimum weight of increments. Extreme oversize particles should be noted and agreement should be reached as to how they will be handled in the sample collection process. It is recommended that the increment weight should be no less than specified in Table 1, and all increments should be of approximately equal mass.

6.2.2 For a lot of up to 1000 net tons, for the purpose of uniformity only, it is suggested that the number of increments collected to represent that lot should be no less than 35.

6.2.3 For a lot of more than 1000 tons, where one gross sample will be used, for the purpose of uniformity only, the following equation may be used to determine the recommended minimum number of increments to be collected:

$$N = 35\sqrt{\frac{\text{total lot size (tons or Mg)}}{\text{1000 tons or 908 Mg}}} \quad (1)$$

where:

N = minimum number of increments required.

6.3 *Increment Collection*—Increments are collected from holes dug to a depth of at least 18 in. (46 cm), around the base of the stockpile, and up the slopes of the pile. The angles of the sides of the holes should be less than the angle of repose. The coal that is removed from the holes is placed away from the sampling area. The increment is then removed from the bottom of the hole and placed into its container, avoiding any spillage. All increments collected should be promptly sealed and identified in their containers and prepared for analyses in accordance with Method D 2013.

6.3.1 The pattern of increment placement can be dependent upon the height and shape of the stockpile. Space the increments over the surface of the stockpile so that each increment will represent equally sized areas. This will require different spacing of increments as the profile of the pile changes.

6.3.2 As increments are collected, protect them from contamination and moisture loss or gain. Place the increments in plastic-lined canvas bags, metal drums with plastic liners, plastic buckets with airtight lids, or other appropriate containers.

TABLE 1 Weight of Increments for Manual Sampling of Coal Contained in Stockpiles (For Lots Up to 1000 Net Tons or 908 Mg)

Top Size	⅝ in. (16 mm)	2 in. (50 mm)	6 in. (150 mm)
Minimum weight of increments, lb	2	6	15
Minimum weight of increments, kg	1	3	7

6.3.3 Each sample must be clearly identified. Place a moisture-proof identification tag inside the sample container and attach another securely on the outside of the sample container.

6.3.4 Sample identification shall include the sampling technician's initials, the date, the location, weather conditions, the number of increments, and the sampling method used. This information will become part of the analytical report. Other notes or pertinent information can be recorded in the sampling log (see Section 8). This information may or may not be on the report, but it shall be retained as a part of the laboratory records.

6.4 *Collection Devices*—The top size of the coal to be sampled should be ascertained to determine the size of the increment collection device opening (a minimum of two and one half times the top size of the coal). Types and dimensions of sampling implements should be agreed upon by all interested parties before commencement of sampling. A common flat, square shovel with the two sides and the back built up with metal plates which are at least 10 cm (4 in.) high is a device that is commonly used to obtain manual samples.

6.4.1 There are occasions when the use of an end loader to expose multiple faces can increase the accessible material for sampling. While increasing the proportion of the lot available to be sampled, the resulting sample still does not meet the minimum requirements for probability sampling and as such cannot be used to draw statistical inferences about the precision, standard error, or bias.

6.4.2 One example is to use heavy equipment, such as an end loader, to remove outside material thus allowing increments to be taken from a freshly exposed face. Another example is to have the loader bucket remove primary increments and then manually subsample each increment with a built-up shovel (see Section 7).

6.5 In extremely cold weather, coal can become frozen on the surface as well as inside the stockpiles. Do not attempt to collect increments manually from frozen coal. Wait until it thaws. If sampling is necessary while coal is frozen, make note of the coal's condition when it was sampled. It will be extremely difficult or even impossible to collect increments properly.

7. Hazards

7.1 **Warning**—Stockpile sampling involves exposure to hazardous operations, conditions, and equipment. Awareness to personnel safety cannot be overemphasized. Personnel may require approved federal and/or state safety training before taking part in field sampling. Site-specific safety regulations must be observed. This includes personnel wearing all specified personal protection equipment. The general safety precautions necessary when working around moving equipment must be observed. Sampling technicians must never work in coal that is stockpiled over underground feeders or where there is the possibility of the stockpile being eroded from beneath them. Sampling should never be performed near a highwall face where the highwall extends upward at an angle greater than the angle of repose of the coal.

8. Sampling Log

8.1 Sampling technicians should keep a written log. A sampling log contains sample identification and also notations of conditions encountered during increment collection. Entries to be noted include, but are not limited to: size of stockpile, size segregation patterns, general configuration of stockpile, compaction of stockpile, perimeter conditions of pile, degree of contamination, and the visual appearance of the material.

8.2 Any modifications to a sampling plan should be discussed with the interested parties, if possible. Any changes to the agreed upon sampling plan are to be documented on the sampling log. If it is not possible or feasible to discuss modifications, both the fact that discussion was not possible, and the actual modifications that were made, are to be documented on the sampling log.

9. Personnel

9.1 Sampling technicians using this practice need to be trained in field sampling and be familiar with Practice D 2234.

9.2 Field situations often dictate on-site modifications of sampling plans. Modifications of a sampling plan should only be made by personnel with an understanding of and a sense of responsibility for the potential effects that the deviations will have on the sample being taken.

10. Keywords

10.1 manual sampling; stockpiles

APPENDIX

(Nonmandatory Information)

X1. RATIONALE

X1.1 A need in industry was identified to provide some estimate of the quality of coal contained in stockpiles when obtaining a probability sample (Conditions A or B in Practice D 2234) is not physically or economically feasible or both. The procedures described here are designed to provide guidelines for conducting sampling under these conditions.

X1.2 It is recognized that obtaining a sample of a single lot of coal from a stockpile that provides a reasonable estimate of the quality of the lot from which it was taken presents some unique problems. This sample represents only the outer layer(s) of coal in stockpiles. This sampling practice should not be considered as a substitute for a more reliable sampling method, for example, full-stream mechanical sampling.