



Designation: D4596 – 22

Standard Practice for Collection of Channel Samples of Coal in a Mine¹

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1. Scope

1.1 This practice describes procedures for collecting a coal sample from a channel extending from top to bottom in the face of a coal seam in a mine.

1.2 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary information, see [Note 2](#).

1.4 *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

- [D121 Terminology of Coal and Coke](#)
- [D388 Classification of Coals by Rank](#)
- [D5192 Practice for Collection of Coal Samples from Core](#)
- [D2234/D2234M Practice for Collection of a Gross Sample of Coal](#)
- [D2796 Terminology for Megascopic Description of Coal and Coal Seams and Microscopical Description and Analysis of Coal \(Withdrawn 1995\)](#)³
- [D4371 Test Method for Determining the Washability Characteristics of Coal](#)

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

3. Summary of Practice

3.1 At selected sites in the mine, the face of the seam is cleaned of weathered coal and debris and the face is evened. A channel of uniform horizontal cross section is cut from the coal seam and the coal therefrom is collected for analysis and testing.

4. Significance and Use

4.1 A properly collected face channel sample that includes the total coal bed interval provides a sample that is a representative cross section of the coal bed at the point of sampling. Channel samples are taken for subsequent testing needed for evaluation of coal quality and characterization for commercial evaluations, for planning of mining operations to maintain coal quality, for the determination of coal rank in accordance with Classification [D388](#), and for geologic coal resource studies.

NOTE 1—Because of the potential for lateral variability, a sample may not represent the quality of the coal bed at another sample point. The reliability of the data generated from channel samples is dependent on the number and spacing of the sample points and the variability of the coal characteristics in a given area.

NOTE 2—Sampling of the mine product for these purposes is unsatisfactory because of contamination of the product with out-of-seam material, selective mining of parts of a seam, inability to obtain samples from one or more specific locations in the mine, or other incompatibility of the purpose of sampling with the mining practice. Conversely, channel samples should not be used for evaluation of the quality of commercial shipments of the mine product, which should be sampled in accordance with Methods [D2234/D2234M](#).

5. Apparatus

5.1 *Steel Measuring Tape*, not less than 3 m (8 ft) long.

5.2 *Miner's Pick or Similar Tool*, with file for sharpening. Other devices may be used such as a pneumatically operated chain saw with tungsten carbide teeth.

5.3 *Brush or Broom*, for removing loose particles on the coal face.

5.4 *Chalk*.

5.5 *Sample Containers With Closures*—If the sample is to be used for determination of inherent moisture, the container shall be such that less than 0.05 % of the sample weight is lost between the time of sealing the container with sample and the time of opening for preparation of the sample for analysis. Steel airtight containers with polyethylene bag liners have been

found to be satisfactory for this purpose. For other purposes, bags made of a strong cloth and lined with a polyethylene bag may be suitable.

5.6 *Ground Cloth*—Canvas tarpaulin or heavy-duty plastic sheet about 3 m by 3 m (10 ft by 10 ft). If the purpose of sampling includes the determination of inherent moisture, the sheet shall be of low water solubility and permeability, such as polyethylene or oilcloth.

5.7 *Tags and Pen*, for sample identification and for marking.

5.8 *Shovel*.

5.9 *Notebook and Pencil*, or other means for record keeping.

6. Planning of Sampling

6.1 The objective of face channel sampling is to collect representative samples from a fresh, unweathered coal seam at each point of sampling for subsequent testing needed for the evaluation of coal quantity and quality for commercial evaluations. Obtain information such as geologic, topographic, and land ownership to locate suitable sites for face channel sampling. Choose sites that will best satisfy the specific purpose of sampling.

NOTE 3—Although ASTM Manual 11⁴ was developed specifically for guidance in core sampling (Practice D5192), many topics in that Manual are common to face channel sampling. The planning, sample compositing, and other related issues in Manual 11 may be helpful in developing successful face channel sampling programs.

6.2 *Considerations Regarding Weathered Coal and Inherent Moisture*:

6.2.1 Weathered coal is unsuitable for inclusion in channel samples collected to secure fresh and unaltered material. Obvious indications of weathering include, but are not limited to: (1) any discoloration or staining on broken coal surfaces or cleats, (2) presence of sulfate minerals resulting from oxidation of pyrite, (3) presence of gypsum (calcium sulfate) crystals, and (4) presence of dust, fine cracked and crazed coal surfaces, or (5) blocky, fragmented condition of the coal resulting from loss of inherent moisture.

6.2.2 Weathered coal typically contains anomalously low total moisture, yields low calorific value (as-received, dry and moisture-and-ash-free basis), and also produces atypical results for other tests. Additionally, weathered coal cannot be used for classification according to rank. Sampling to different depths and testing of the properties may be required to establish the depth at which unweathered coal can be obtained.

6.2.3 For coal resource assessments, the collection of samples containing their full complement of inherent moisture is required. In cases where that condition may not always be readily discernable, a simple field test can be used to qualitatively identify seemingly fresh coal that has lost some inherent moisture but has not yet obviously weathered. A light coating of water is sprayed or wiped onto the surface of the coal and the rate at which it disappears is observed. Rapid disappearance (typically within a few seconds) indicates absorption and demonstrates that the coal contains less than its full comple-

ment of inherent moisture. Slower disappearance (taking perhaps a minute or more) is characteristic of evaporation and suggests that the pores are filled with moisture. To account for variations in field conditions such as temperature, humidity, different absorption rates by different coals, and so forth, the test is applied to a number of coal pieces both before and during the sample collection process.

6.3 *Sampling Plan for Classification According to Rank*:

6.3.1 A minimum of three, but preferably five or more, face channel samples are required to characterize the rank of the coal in a given area in accordance with Classification D388. Face channel samples containing weathered coal are unsuitable for the determination of standard rank.

6.3.2 The channel size shall be at least 8 cm (3 in.) deep and 10 cm (4 in.) wide, and shall yield at least 3 kg (6 lb) of coal for each foot of thickness of coal seam.

6.3.3 All roof and floor rock, mineral partings more than 1 cm (3/8 in.) thick, and mineralized lenses or concretions (such as sulfur balls) more than 1¼ cm (½ in.) thick and 5 cm (2 in.) wide shall be excluded from the sample.

6.4 *Sampling for Other Purposes*—Variations in the purpose of sampling and in conditions encountered in the field preclude the establishment of rigid procedures covering every sampling situation. In each case, formulate a plan taking into account the mining operation, the purpose of the sampling, and the known characteristics of the coal seam. Characteristics include lateral or vertical variations in coal quality, occurrences of persistent mineral partings or concretions within the seam, and the extent of oxidation or weathering of coal. Take these considerations into account in planning sample site selection and whether lithotypes, partings, and layers above and below the seam should be described.^{5,6} Also establish a method of preparing the coal face and determining the size of sample.

6.4.1 A channel at least 8 cm (3 in.) deep (into the face of the seam) and 10 cm (4 in.) wide yields a sufficient sample for most purposes. The channel may be enlarged to minimize the effect of channel size variability when a coal characteristic of interest, such as ash content, varies greatly from layer to layer in the seam, or when the coal breaks unevenly. Also, the channel cross-section may be enlarged to obtain sufficient sample for tests requiring large amounts. The size of channel for the required amount of coal may be estimated from the density of coal—approximately 1.3 g/cm³ (0.05 lb/in.³). For information on determining washability, see Test Method D4371 and the report by Wizzard.⁷

7. Sampling Procedures

7.1 At each sampling site, survey the condition of the coal face and the rock above the coal (if exposed).

Warning—Beware of danger from rock falling from the roof of underground mines or from the highwall of surface

⁵ Schopf, J. M., "Field Description and Sampling of Coal Beds," U.S. Geological Survey Bulletin No. 1111-B, 1960.

⁶ *Field Description of Coal* ASTM, 1978, pp. 3–33, 58–68, ASTM STP 661.

⁷ Wizzard, J. T., "The Reliability of Using Channel Samples to Represent Run-of-Mine Coal Washability," DOE/PETC/TR-82/3.

⁴ *Manual on Drilling, Sampling, and Analysis of Coal*, ASTM MNL 11, ASTM, 1992.