



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 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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary information, see [Note 2](#).

2. Referenced Documents

2.1 *ASTM Standards:*²

[D121 Terminology of Coal and Coke](#)

[D388 Classification of Coals by Rank](#)

[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Terminology for Megascopic Description of Coal and Coal Seams and Microscopical Description and Analysis of Coal \(Withdrawn 1995\)](#)³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](#)

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

¹ This practice is under the jurisdiction of ASTM Committee [D05](#) on Coal and Coke and is the direct responsibility of Subcommittee [D05.18](#) on Classification of Coals.

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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.

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 by 3 m (10 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 *Considerations regarding weathered coal and inherent moisture:*

Weathered coal is unsuitable for inclusion in channel samples collected to secure fresh and unaltered material. Weathered coal typically contains anomalously low total moisture, yields low calorific value (dry and moisture-and-ash-free basis), and also produces atypical results for other tests. It does not reflect unaltered in-situ coal properties, cannot be used for classification according to rank, and does not give accurate estimates of typical as-mined moisture.

6.1.1 Obvious indications of weathering include, but are not limited to: (1) any discoloration of 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, cracked and crazed coal surfaces, or a fragmented condition of the coal blocks resulting from loss of inherent moisture.

6.1.2 It is often useful to collect samples containing their full complement of inherent moisture, but 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 complement 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.

6.2 *Sampling Plan for Classification According to Rank:*

6.2.1 Refer to Section 7 of Classification **D388** for information on the required number and location of samples.

6.2.2 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.

6.2.3 All roof and floor rock, mineral partings more than 1 cm ($\frac{3}{8}$ in.) thick, and mineralized lenses or concretions (such as sulfur balls) more than $1\frac{1}{4}$ cm ($\frac{1}{2}$ in.) thick and 5 cm (2 in.) wide shall be excluded from the sample.

6.3 *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.^{4,5} Also establish a method of preparing the coal face, and determining the size of sample.

6.3.1 Obtain information for identification of suitable locations for sampling. Choose sites that will best satisfy the purpose of sampling.

6.3.2 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/cm^3 (0.05 lb/in.^3). For information on determining washability, see Test Method **D4371** and the report by Wizzard.⁶

6.3.3 Practice with respect to weathering of the coal depends on a number of factors. Some characteristics of coal, such as total sulfur content, do not change appreciably with weathering if the coal is not leached. The forms of sulfur, the moisture-holding capacity, and oxygen content of high volatile C bituminous and lower rank coals, and the rheological properties of coking coals do change with weathering. Sampling to different depths and testing of such properties may be required to establish the depth at which unweathered coal can be obtained.

7. Sampling Procedures

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

NOTE 3—**Warning:** Beware of danger from rock falling from the roof of underground mines or from the highwall of surface mines. Take down any loose blocks as a safety precaution and to prevent extraneous material from subsequently contaminating the sample.

7.2 With a miner's pick, remove weathered coal from the face area to be sampled, to the depth (but at least 3 cm (1 in.)) required in the plan of sampling. True up to the face to leave a straight surface normal to the bedding and free of extraneous matter.

⁴ Schopf, J. M., "Field Description and Sampling of Coal Beds," U.S. Geological Survey Bulletin No. 1111-B, 1960.

⁵ *Field Description of Coal* ASTM, 1978, pp. 3–33, 58–68, *ASTM STP 661*.

⁶ Wizzard, J. T., "The Reliability of Using Channel Samples to Represent Run-of-Mine Coal Washability," *DOE/PETC/TR-82/3*.

7.3 Describe and record observations on the character of layers in the coal seam (see Terminology **D121** or Definitions **D2796**) to the extent required by the sampling plan.

7.4 Mark the sides of the channel with chalk and mark any mineral partings or other parts of the seam that are to be discarded.

7.5 Clear and smooth the floor adjacent to the sample area and spread a ground cloth on the floor with one edge at the coal face.

7.6 Cut away with a miner's pick (or other tool) a channel from top to bottom (or bottom to top) of the coal seam. If a saw is used at the sides of the channel, exercise care that fines generated by the saw do not become part of the sample. Ensure that all material from the channel that is to be sampled according to the plan of sampling falls on the ground cloth and

that any mineral matter to be discarded does not contaminate the coal sample. Cut the channel to a uniform width and depth in a rectangular cross section, to ensure that representative volumes of material are obtained from every part of the coal seam.

7.7 As quickly as possible, if inherent moisture will be determined, transfer the material on the ground cloth to a sample container and seal and then label the container. If surface moisture is visible on the coal, or if there is any reason to question the accuracy of inherent moisture content determined from the sample, the description of the sample shall include the warning: "Moisture content questionable."

8. Keywords

8.1 channel; coal; mine; rank; sample collection; sampling

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