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Designation: D3174 - 12 D3174 - 12 (Reapproved 2018)

Standard Test Method for Ash in the Analysis Sample of Coal and Coke from Coal¹

This standard is issued under the fixed designation D3174; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of the inorganic residue as ash in the analysis sample of coal or coke as prepared in accordance with Practice D2013 or Practice D346. The results obtained can be applied as the ash in the proximate analysis, Practice D3172, and in the ultimate analysis, Practice D3176. For the determination of the constituents in ash, reference is made to Test Methods D3682, D4326, and D6349. Test MethodMethods D6357 should be used to prepare ash to be used for trace element analysis. See Terminology D121 for definition of ash.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this-The values given in parentheses after SI units are provided for information only and are not considered 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 safety, health, and health environmental practices and determine the applicability of regulatory limitations prior to use.

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

- D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis
- D388 Classification of Coals by Rank
- D1757 Test Method for Sulfate Sulfur in Ash from Coal and Coke (Withdrawn 2009)³
- D2013 Practice for Preparing Coal Samples for Analysis
- D2795 Test Methods for Analysis of Coal and Coke Ash (Withdrawn 2001)³
- D3172 Practice for Proximate Analysis of Coal and Coke
- D3173 Test Method for Moisture in the Analysis Sample of Coal and Coke
- D3176 Practice for Ultimate Analysis of Coal and Coke
- D3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases
- D3682 Test Method for Major and Minor Elements in Combustion Residues from Coal Utilization Processes
- D4326 Test Method for Major and Minor Elements in Coal and Coke Ash By X-Ray Fluorescence
- D5016 Test Method for Total Sulfur in Coal and Coke Combustion Residues Using a High-Temperature Tube Furnace Combustion Method with Infrared Absorption
- D6349 Test Method for Determination of Major and Minor Elements in Coal, Coke, and Solid Residues from Combustion of Coal and Coke by Inductively Coupled Plasma—Atomic Emission Spectrometry
- D6357 Test Methods for Determination of Trace Elements in Coal, Coke, and Combustion Residues from Coal Utilization Processes by Inductively Coupled Plasma Atomic Emission Spectrometry, Inductively Coupled Plasma Mass Spectrometry, and Graphite Furnace Atomic Ab

D3174-11.-12. DOI: 10.1520/D3174-12.10.1520/D3174-12R18.

¹ This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.21 on Methods of Analysis. Current edition approved Nov. 1, 2012Oct. 15, 2018. Published December 2012 April 2019. Originally approved in 1973. Last previous edition approved in 2011/2012 as

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.



FIG. 1 Air Aspirator

<u>ASTM D31/4-12(2018)</u>

/catalog/standards/astm/6b16bf33-c6ce-430b-bb37-f9aa31e91eca/astm-d3174-12-2018

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology D121.

4. Summary of Test Method

4.1 Ash is determined by weighing the residue remaining after burning the coal or coke under rigidly controlled conditions of sample weight, temperature, time, atmosphere, and equipment specifications.

5. Significance and Use

5.1 Ash, as determined by this test method, is the residue remaining after burning the coal and coke. Ash obtained differs in composition from the inorganic constituents present in the original coal. Incineration causes an expulsion of all water, the loss of carbon dioxide from carbonates, the conversion of iron pyrites into ferric oxide, and other chemical reactions. Ash, as determined by this test method, will differ in amount from ash produced in furnace operations and other firing systems because incineration conditions influence the chemistry and amount of the ash. References for correcting ash results determined by this test method to a mineral-matter-free basis are listed in Classification D388, Section 9-9.

6. Apparatus

6.1 *Electric Muffle Furnace for Coal or Coke*—For determination of ash of coal and coke, the furnace shall have an adequate air circulation and be capable of having its temperature regulated at 500°C, 750°C, 500 °C, 750 °C, and 950°C.950 °C. The furnace shall be equipped with a temperature indicator and means of controlling the temperature within prescribed limits. Means shall be provided for maintaining air flow at a rate of two to four changes per minute (see Fig. 1 and Fig. 2). Combustion gases shall be vented from laboratory. Inlet and outlet ports shall be located and arranged to distribute the air uniformly throughout the furnace