



Standard Test Method for Determination of Grain Stability of Calcined Petroleum Coke¹

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1. Scope*

1.1 This test method covers a laboratory vibration mill method for the determination of the grain stability of calcined petroleum coke for the manufacture of carbon products used in the smelting of aluminum. Calcined petroleum coke with poor mechanical strength may become degraded during mixing. Poor grain stability will affect the grain size and may result in poor quality of baked blocks.

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.*

2. Referenced Documents

2.1 ASTM Standards:²

D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis

D2013 Practice for Preparing Coal Samples for Analysis

D2234/D2234M Practice for Collection of a Gross Sample of Coal

D6969 Practice for Preparation of Calcined Petroleum Coke Samples for Analysis

D6970 Practice for Collection of Calcined Petroleum Coke Samples for Analysis

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.05 on Properties of Fuels, Petroleum Coke and Carbon Material.

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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.

2.2 ISO Standard:³

ISO 6375 Carbonaceous Materials for the Production of Aluminum—Coke for Electrodes—Sampling

3. Terminology

3.1 Definitions:

3.1.1 *calcined petroleum coke, n*—petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure.

3.1.2 *petroleum coke, n*—solid, carbonaceous residue produced by thermal decomposition of heavy petroleum fractions, or cracked stocks, or both.

4. Summary of Test Method

4.1 A representative sample of calcined petroleum coke is dried and screened to a 4 to 8 mm fraction. The resultant sample is weighed so that two separate portions of 100.0 ± 0.5 g mass are obtained. The samples are placed into the laboratory mill and ground for a specified period of time. After grinding the sample is screened and the mass of the +4 mm material is determined. The grain stability is the percent of the original material remaining on the +4 mm sieve.

5. Significance and Use

5.1 The grain stability of calcined petroleum coke determines the resistance to breakdown of +4 mm particles used in the manufacture of carbon anodes for use in the reduction process of aluminum.

5.2 Calcined petroleum cokes have to be relatively easy to grind for fines production but strong enough to withstand forming pressures and thermal stresses occurring when the anodes are used in the reduction process.

6. Interferences

6.1 No material normally applied to the calcined petroleum coke is found to cause analytical interference with this procedure.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.