



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 coke for the manufacture of carbon products used in the smelting of aluminum. Calcined 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 acceptable metric units are to be regarded as the 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:

D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis²

D 2013 Method of Preparing Coal Samples for Analysis²

D 2234 Test Methods for Collection of a Gross Sample of Coal²

E 11 Specification for Wire-Cloth Sieve for Testing Purposes³

2.2 ISO Standard:⁴

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

3. Terminology

3.1 Definitions:

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

3.1.2 *petroleum coke*—a 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 mm to 8 mm fraction. The resultant sample is weighed so that two separate portions of 100.0 g ± 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 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.

7. Apparatus

7.1 *Analytical Balance*, accurate to ±0.1 g.

7.2 *Rifflers*, with hoppers and closures.

7.3 *Wire Sieves*, 8 mm (5/16 in.) and 4 mm (5 mesh), meeting Specification E 11.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.05.0D on Petroleum Coke.

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² *Annual Book of ASTM Standards*, Vol 05.06.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

