



Designation: ~~D2416 – 84 (Reapproved 2009)~~ D2416 – 84 (Reapproved 2015)^{ε1}

Standard Test Method for Coking Value of Tar and Pitch (Modified Conradson)¹

This standard is issued under the fixed designation D2416; 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.

^{ε1} NOTE—SI units formatting was corrected editorially in May 2015.

1. Scope

1.1 This test method covers the determination of the coking value of tar and pitch having an ash content not over 0.5 % as determined by Test Method [D2415](#).

1.2 Coking values by this test method are practically the same as those obtained by Test Method [D189](#), but results are more reproducible. The apparatus used is identical, except that an electric furnace is substituted for the gas flame.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *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

[D140 Practice for Sampling Bituminous Materials](#)

[D189 Test Method for Conradson Carbon Residue of Petroleum Products](#)

[D370 Practice for Dehydration of Oil-Type Preservatives](#)

[D2415 Test Method for Ash in Coal Tar and Pitch](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves](#)

3. Summary of Test Method

3.1 A sample of the tar or pitch is vaporized and pyrolyzed for a specified time at a specified temperature in special standardized equipment that limits the available oxygen supply. The percentage of residue is reported as the coking value.

4. Significance and Use

4.1 This test method is useful for indicating the relative coke-forming propensities and for evaluating and characterizing tars and pitches. This test method can also be used as one element in establishing the uniformity of shipments or sources of supply.

5. Apparatus (see [Fig. 1](#))

5.1 *Crucible*—Wide-form, *a*, either porcelain, glazed throughout, or silica, *a*; ~~2929 mL~~ to ~~31-mL~~31 mL capacity, ~~4646 mm~~ to ~~49 mm~~49 mm in rim diameter.

5.2 *Skidmore Crucible*—Iron crucible, *b*, flanged and ringed, ~~6565 mL~~ to ~~82-mL~~82 mL capacity, ~~5353 mm~~ to ~~57-mm~~57 mm inside and ~~6060 mm~~ to ~~67-mm~~67 mm outside diameter of flange, ~~3737 mm~~ to ~~39-mm~~39 mm in height, supplied with a cover without delivery tubes and having the vertical opening closed. The horizontal opening of about ~~6.5 mm~~6.5 mm shall be kept clean. The outside diameter of the flat bottom shall be ~~3030 mm~~ to ~~32-mm~~32 mm.

5.3 *Metal Crucible*—Spun sheet-iron or nickel crucible, *c*, with cover; ~~7878 mm~~ to ~~82-mm~~82 mm in outside diameter at the top, ~~5858 mm~~ to ~~60-mm~~60 mm in height, and approximately ~~0.8 mm~~0.8 mm in thickness. At the bottom of this crucible, and level

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum ~~Products~~—[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.

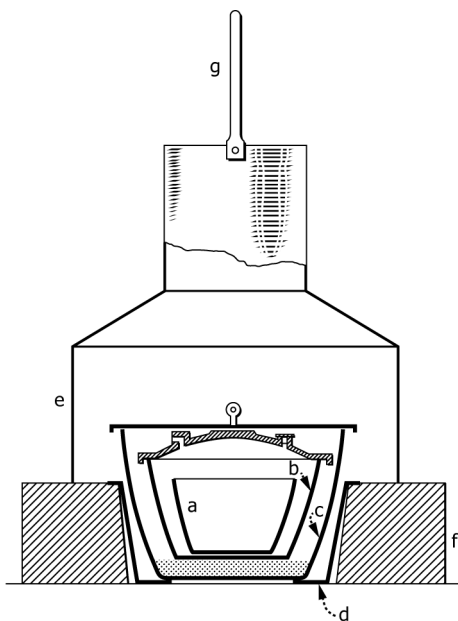


FIG. 1 Apparatus for Determining Carbon Residue

before each test, shall be a layer of about 25 mL of sand, or enough to bring the Skidmore crucible, with cover on, nearly to the top of the sheet-iron crucible. The sand shall be dry and screened to pass through a 65-mesh screen and to be retained on a 200-mesh screen.

5.4 *Wire Support*—Triangle (65 mm) of bare Nichrome wire 1.5 mm to 2.0 mm in cross section, having an opening small enough to support the bottom of the metal crucible (see 5.3). The triangle, *d*, shall have its arms bent to form a cradle that will support the metal crucible with its bottom level with the bottom of the insulator (see 5.6).

5.5 *Hood*—Circular, sheet-iron, *e*, from 120 mm to 130 mm in diameter, the height of the lower perpendicular side to be from 50 mm to 53 mm; provided at the top with a chimney 50 mm to 60 mm in height and 50 mm to 56 mm in inside diameter, which is attached to the lower part having the perpendicular sides by a cone-shaped member, bringing the total height of the complete hood to 125 mm to 130 mm. The hood may be made from a single piece of metal, providing it conforms to foregoing dimensions. A bridge, *g*, made of approximately 3 mm iron or nichrome wire, and having a height of 50 mm above the top of the chimney, shall be attached to handle the chimney when positioning.

5.6 *Insulator*—Ceramic block or refractory ring, *f*, 150 mm to 175 mm in diameter if round, or on a side if square, 32 mm to 38 mm in thickness, provided with an inverted cone-shaped opening through the center; 83 mm in diameter at the bottom and 89 mm in diameter at the top.

5.7 *Vertical Electric Furnace*³—Bore a hole in the bottom and insert the thermocouple of the pyrometer controller so that its junction is centered exactly 38 mm below the furnace opening.

5.8 *Pyrometer Controller*⁴—The pyrometer controller should be checked periodically against a calibrated reference thermocouple, placed alongside but not touching, to ensure that the furnace is operating at the desired temperature. Appropriate changes in the controller circuit should be made, when necessary, to maintain the required temperature.

5.9 *Sieve*—U. S. Standard No. 30 (600 μm), conforming to Specification E11.

6. Bulk Sampling

6.1 Samples from shipments shall be taken in accordance with Practice D140, and shall be free of foreign substances. Thoroughly mix the sample immediately before removing a representative portion for the determination or for dehydration.

³ The sole source of supply of a Crucible furnace, Hoskins No. FD104, or equivalent, known to the committee at this time is National Element, Inc., 422 Oliver Street, Troy, MI 48084. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁴ Omega Model D921 Digital Controller with 15 amp relay, available from Omega Engineering, Inc., Stamford, CT; or Thermo Electric Model 700, available from Thermo Electric, Saddle Brook, NJ; or equivalent. Minimum line voltage required for 220 V furnace is 205 V. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.