Designation: D 189 – 01

An American National Standard
British Standard 4380

Designation: 13/94

Standard Test Method for Conradson Carbon Residue of Petroleum Products[1]

This standard is issued under the fixed designation D 189; 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 is also a standard of the Institute of Petroleum issued under the fixed designation IP 13. The final number indicates the year of last revision.

This standard has been approved for use by agencies of the Department of Defense.
This method was adopted as a joint ASTM—IP standard in 1964.

This method has been adopted for use by government agencies to replace Method 5001 of Federal Test Method Standard No. 791b.

1. Scope

1.1 This test method covers the determination of the amount of carbon residue (Note 1) left after evaporation and pyrolysis of an oil, and is intended to provide some indication of relative coke-forming propensities. This test method is generally applicable to relatively nonvolatile petroleum products which partially decompose on distillation at atmospheric pressure. Petroleum products containing ash-forming constituents as determined by Test Method D 482 or IP Method 4 will have an erroneously high carbon residue, depending upon the amount of ash formed (Note 2 and Note 4).

NOTE 1—The term *carbon residue* is used throughout this test method to designate the carbonaceous residue formed after evaporation and pyrolysis of a petroleum product. The residue is not composed entirely of carbon, but is a coke which can be further changed by pyrolysis. The term *carbon residue* is continued in this test method only in deference to its wide common usage.

NOTE 2—Values obtained by this test method are not numerically the same as those obtained by Test Method D 524. Approximate correlations have been derived (see Fig. X1.1), but need not apply to all materials which can be tested because the carbon residue test is applied to a wide variety of petroleum products.

NOTE 3—The test results are equivalent to Test Method D 4530, (see Fig. X1.2).

NOTE 4—In diesel fuel, the presence of alkyl nitrates such as amyl nitrate, hexyl nitrate, or octyl nitrate causes a higher residue value than observed in untreated fuel, which can lead to erroneous conclusions as to the coke forming propensity of the fuel. The presence of alkyl nitrate in the fuel can be detected by Test Method D 4046.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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 482 Test Method for Ash from Petroleum Products[2]
D 524 Test Method for Ramsbottom Carbon Residue of Petroleum Products[2]
D 4046 Test Method for Alkyl Nitrate in Diesel Fuels by Spectrophotometry[3]
D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products[3]
D 4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants[3]
D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products[3]
D 4530 Test Method for Determination of Carbon Residue (Micro Method)[3]
E 1 Specification for ASTM Thermometers[4]
E 133 Specification for Distillation Equipment[5]

3. Terminology

3.1 *Definitions:*

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.06 on Analysis of Lubricants.

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In the IP, this method is under the jurisdiction of the Standardization Committee.

This procedure is a modification of the original Conradson method and apparatus for Carbon Test and Ash Residue in Petroleum Lubricating Oils. See *Proceedings*, Eighth International Congress of Applied Chemistry, New York, Vol 1, p. 131, September 1912; also *Journal of Industrial and Engineering Chemistry*, IECHA, Vol 4, No. 11, December 1912.

In 1965, a new Fig. 2 on reproducibility and repeatability combining ASTM and IP precision data replaced old Fig. 2 and Note 4.

[2] *Annual Book of ASTM Standards*, Vol 05.01.
[3] *Annual Book of ASTM Standards*, Vol 05.02.
[4] *Annual Book of ASTM Standards*, Vol 14.03.
[5] *Annual Book of ASTM Standards*, Vol 14.04.

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