# International Standard 6615

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# Petroleum products — Determination of carbon residue — Conradson method

*Produits pétroliers — Détermination du résidu de carbone — Méthode Conradson*

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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6615 was developed by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, and was circulated to the member bodies in January 1982.

It has been approved by the member bodies of the following countries:

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|---|---|---|
| Australia | Hungary | South Africa, Rep. of |
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| Brazil | Italy | Sweden |
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The member body of the following country expressed disapproval of the document on technical grounds:

Netherlands



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# Petroleum products — Determination of carbon residue — Conradson method



## 1 Scope and field of application

**1.1** This International Standard specifies a method for determining the amount of carbon residue left after evaporation and pyrolysis of an oil, and is intended to provide some indication of relative coke-forming propensities. The method is generally applicable to relatively non-volatile petroleum products which partially decompose on distillation at atmospheric pressure. Petroleum products containing ash-forming constituents as determined by ISO 6245 will have an erroneously high carbon residue, depending upon the amount of ash formed.

NOTES

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

2 Values obtained by this method are not numerically the same as those obtained by ISO 4262, nor have satisfactory correlations been found between the results by the two methods for all materials which may be tested, because the carbon residue test is applied to a wide variety of petroleum products. The Conradson carbon residue is finding use to characterize heavy residue fuel coker feed stocks, etc., which cannot readily be loaded into a Ramsbottom coker bulb, and when it is desirable to examine or further test the residue.

**1.2** The carbon residue value of burner fuel serves as a rough approximation of the tendency of the fuel to form deposits in vaporizing pot-type and sleeve-type burners. Similarly, provided amyl nitrate is absent (or if it is present, provided the test is performed on the base fuel without additive) the carbon residue of diesel fuel correlates approximately with combustion chamber deposits.

**1.3** The carbon residue value of gas oil is useful as a guide in the manufacture of gas from gas oil while the carbon residue value of crude oil residuums, cylinder and bright stocks are useful in the manufacture of lubricants.

**1.4** The following anomalous cases should be noted:

a) Motor oils. The carbon residue value of motor oil, while at one time regarded as indicative of the amount of carbonaceous deposits a motor oil would form in the combustion chamber of an engine, is now considered to be of doubtful significance due to the presence of additives in many oils. For example, an ash-forming detergent additive may increase the carbon residue value of an oil yet will generally reduce its tendency to form deposits.

b) Diesel fuels. The carbon residue value of diesel oils containing amyl nitrate is erroneously high. If, however, the test is carried out on diesel fuels not containing amyl nitrate or on the base fuel to be blended with amyl nitrate, the carbon residue value correlates approximately with combustion chamber deposits.

c) Petroleum products containing ash-forming additives may give carbon residue values which may not correlate with the tendency to form deposits and may be higher than the corresponding tendency to form deposits.

## 2 References

ISO 3405, *Petroleum products — Determination of distillation characteristics.*

ISO 4262, *Petroleum products — Determination of carbon residue — Ramsbottom method.*

ISO 6245, *Petroleum products — Determination of ash.*

## 3 Principle

A weighed test portion is placed in a crucible and subjected to destructive distillation. The residue undergoes cracking and coking reactions during a fixed period of severe heating. At the end of the specified heating period, the test crucible containing the carbonaceous residue is cooled in a desiccator and weighed. The residue remaining is calculated as a percentage of the original test portion and reported as Conradson carbon residue.

## 4 Apparatus

**4.1 Porcelain crucible,** wide form, glazed throughout, or a **silica crucible,** 29 to 31 ml capacity, 46 to 49 mm in rim diameter. Porcelain crucible size $^{1}/_{45}$ specified in ISO 1772.

**4.2 Skidmore iron crucible,** flanged and ringed, 65 to 82 ml capacity, 53 to 57 mm inside and 60 to 67 mm outside diameter of flange, 37 to 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 shall be kept clean. The outside diameter of the flat bottom shall be 30 to 32 mm.