
Methods for

The analysis and testing of coal and coke

Part 3 Proximate analysis of coal

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The following BSI references relate to the work on this standard:
Committee reference S1E/45 and S1E/45/8. Draft for comment 72/40659

Co-operating organizations

The Solid Fuel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

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|--|---|
| Association of Consulting Engineers | *Electricity Council, the Central Electricity Generating Board and Area Boards in England and Wales |
| British Cast Iron Research Association | Greater London Council |
| *British Coke Research Association | Heating and Ventilating Contractors' Association |
| British/Ironfounders' Association | *Institute of British Foundrymen |
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| Department of the Environment | |
| Department of Trade and Industry | |
| Domestic Solid Fuel Appliances Approval Scheme | |

The scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

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| British Coal Exporters' Federation | Scientific Instruments Manufacturers' Association of Great Britain |
| British Gas Corporation | Society of Chemical Industry |
| Cement Makers' Federation | Solid Smokeless Fuels Federation |
| Institute of Trading Standards Administration | South Wales Institute of Engineers |
| Institution of Electrical Engineers | Independent experts |
| London Coal Exporters' Association | |



Amendment Slip No.1, published 30 June 1975
to BS 1016 : Part 3 : 1973

Methods for the analysis and testing of coal and coke
Part 3. Proximate analysis of coal

Revised text

AMD 1771
June 1975

Clause 5.4 Special apparatus

In item (1) *Muffle furnace*, line 1, delete 'an adequate zone' and substitute 'a zone of at least 160 mm'.

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**Amendment Slip No. 2,
published and effective from 28 November 1980
to BS 1016 : Part 3 : 1973**

**Methods for the analysis and testing of coal and coke
Part 3. Proximate analysis of coal**

Revised text

**AMD 3337
November 1980**

Contents

In the list of figures, insert the following:

- ‘ 9. Stanley furnace temperature profile
for 90 min ashing
- 10. Stanley furnace

**AMD 3337
November 1980**

Foreword

Delete paragraphs 3 and 4 and substitute the following:

‘For the determination of moisture the direct gravimetric method has been retained and, apart from editorial differences, it is equivalent to that specified in ISO 331-1975 ‘Coal—Determination of moisture in the analysis sample—Direct gravimetric method’. Two indirect methods are also described, one using the minimum-free-space oven and the other using evacuated retort tubes.

The methods for the determination of volatile matter and of ash described here are technically equivalent to those specified respectively in ISO 562-1974 ‘Hard coal and coke—Determination of the volatile matter’ and ISO 1171-1976 ‘Solid mineral fuels—Determination of ash’. In the latter, however, no reference is made to the method for the determination of ash using two furnaces, given here in 6.3, or to the method for the determination of ash using the Stanley furnace, given here in 6.4.’

In paragraph 5, delete the last sentence and substitute the following:

‘Further work on the development of this type of furnace shows that the precision of the results obtained now meet the requirement of clause 8. The Stanley furnace method has therefore been accepted by the Technical Committee responsible for this standard as being suitable for inclusion in this Part of this standard.’

**AMD 3337
November 1980**

Clause 6.1 General

Delete paragraphs 2 and 3 and substitute the following:

‘Three methods are described for the determination of ash:

Single furnace method (see 6.2)

Two furnace method (see 6.3)

Stanley furnace method (see 6.4).

The Stanley furnace method is particularly useful in laboratories where large numbers of ash determinations are required. In all three methods the ventilation of the muffle is such as to minimize fixation of extraneous oxides of sulphur by any basic coal ash.’

Clause 6.4 Calculation of result (for both methods)

Delete the number and title of this clause and substitute the following:

‘6.5 Calculation of result (for all methods)’.

New clause 6.4

Insert the following new 6.4:

‘6.4 Stanley furnace method

6.4.1 Principle. A known mass of the sample is incinerated by mechanically passing it through a furnace heated to a temperature of 815 °C for approximately 90 min. The percentage of ash is calculated from the mass of the residue remaining after incineration.

6.4.2 Special apparatus. The following apparatus is required:

(1) *Stanley furnace*[†]. An electrically heated furnace designed to give a temperature of 815 ± 5 °C at the centre of the hot zone and a temperature profile curve similar to that shown in Fig. 9. The furnace is fitted with a stainless-steel endless chain conveyor driven by a variable-speed motor designed to give a traverse time of approximately 90 min through the furnace. An extension at either end of the furnace provides a pre-heat section and a cooling section.

(2) *Dishes*. Silica dishes 10 mm to 15 mm deep, of such a size that the loading of the coal layer does not exceed 0.06 g/cm², and provided with covers.

NOTE. The lower loading density in this method is to ensure complete combustion.

6.4.3 Procedure. Weigh a clean dry empty dish with its cover to the nearest 0.1 mg. Spread into it an even layer of about 1 g of the coal sample and replace the cover. Reweigh to determine the mass of sample taken. Place the dish at the start of the pre-heat section and remove the cover of the dish. After the dish has passed through the furnace, remove it from the end of the cooling section, replace its cover and reweigh (see note 11). Brush out the ash completely and reweigh the empty dish and its cover.’.

Insert the following footnote:

‘[†]A suitable unit is shown in Fig. 10 and is available commercially from Hedin Limited, Raven Road, South Woodford, London E18.’.

Clause 9 Notes

Delete note 11 and substitute the following:

‘NOTE 11. If incomplete combustion is suspected, e.g. with high ash coals, do not brush out the ash after the first weighing but re-ignite for further periods of 15 min for procedures 6.2.3 and 6.3.3, or if using procedure 6.4.3, pass the dish through the furnace again until constant mass (± 0.3 mg) is obtained; then brush out and reweigh the empty dish.’.

