BS ISO 687:2010

BSI Standards Publication

Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample

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National foreword

This British Standard is the UK implementation of ISO 687:2010. It supersedes BS ISO 687:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PTI/16, Solid mineral fuels.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 70437 6

ICS 75.160.10

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2010.

Amendments issued since publication

Date	Text affected

BS ISO 687:2010

INTERNATIONAL STANDARD

ISO 687

Third edition
2010-06-15

Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample

Combustibles mineraux solides — Coke — Détermination de l'humidité de l'échantillon pour analyse

Reference number
ISO 687:2010(E)

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Published in Switzerland

Contents

Page

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Foreword

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 687 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 5, *Methods of analysis*.

This third edition cancels and replaces the second edition (ISO 687:2004), of which it constitutes a minor revision.

Introduction

The determination of the moisture in the general analysis test sample is required to correct the results of certain analytical determinations, e.g. volatile matter and hydrogen, for the effect of water in the determination and to allow all determinations to be corrected to a dry basis.

Since coke is hygroscopic, its moisture varies with a change in humidity of the atmosphere, and it is required, therefore, that the moisture in the general analysis test sample be determined whenever portions are weighed out for other analytical determinations. If test portions for several analytical determinations are weighed out at the same time, a single simultaneous moisture determination suffices to correct these analyses.

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INTERNATIONAL STANDARD **ISO 687:2010(E)**

Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample

1 Scope

This International Standard specifies a method for determining the moisture in the general analysis test sample of coke. It can be used for the determination of moisture in blast-furnace coke, foundry-coke and other high-temperature carbonization products.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1213-2, *Solid mineral fuels — Vocabulary — Part 2: Terms relating to sampling, testing and analysis*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1213-2 apply.

4 Principle

A known mass of the coke is heated in air at 120 °C to 200 °C and maintained at this temperature until a constant mass is obtained. The moisture content is calculated from the loss in mass of the coke. Coke is not liable to oxidation under the conditions stated.

5 Apparatus

5.1 Analytical balance, capable of weighing to the nearest 0,1 mg.

5.2 Oven, capable of being controlled at a temperature of 120 °C to 200 °C and with a means to allow a flow of air or nitrogen.

5.3 Weighing dish, shallow, of glass or of corrosion-resistant metal, with a well fitting cover, of such a size that the coke layer does not exceed 0,20 g/cm^2.

5.4 Cooling vessel, e.g. **desiccator**, without desiccant, containing a porcelain or a metal plate, preferably of aluminium or copper.

The vessel may be provided with the means to pass air or nitrogen through it during the cooling period.

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6 Preparation of the test sample

The coke used for the determination of moisture content is the general analysis test sample (see ISO 1213-2). Ensure that the moisture content of the sample is in equilibrium with the laboratory atmosphere, exposing it, if necessary, in a thin layer for the minimum time required to achieve equilibrium.

Before commencing the determination, thoroughly mix the equilibrated test sample for at least 1 min, preferably by mechanical means.

7 Procedure

Weigh a clean, dry, empty weighing dish with its cover to the nearest 0,1 mg. Add 1 g ± 0,1 g of the coke sample in an even layer and reweigh. Heat the uncovered dish in the oven at 120 °C to 200 °C.

When the drying period is complete, remove the dish with the dried sample from the oven and replace the cover immediately. If the size of the oven allows, replace the cover while the dish is still in the oven. Allow the dish to cool on a thick metal plate for 10 min. At the end of the 10 min cooling period, transfer the dish to a cooling vessel (5.4) and allow to cool to room temperature. As soon as room temperature is reached, reweigh to the nearest 0,1 mg.

NOTE 1 If a cooling vessel with air or nitrogen flow is used the dish can be transferred directly without cooling on a metal plate.

If there is any doubt that drying is complete, reheat at 120 °C to 200 °C for further 30 min periods until the change in mass between successive weighings does not exceed 1 mg.

For a particular oven, the times required to ensure constancy in mass shall be verified by experiments.

NOTE 2 Heating for 4 h is normally sufficient.

The time taken for the determination can be considerably shortened if drying is carried out at a temperature of 320 °C in a nitrogen atmosphere, when heating for 1 h usually suffices. For this procedure, a minimum free space oven may be used.

If appropriate, the drying can be done at lower temperature, e.g. 105 °C to 110 °C, as for hard coal. It is necessary to verify by experiments the times required to ensure constancy in mass.

8 Expression of results

The moisture in the coke as analysed, $\omega_{H_2O,ad}$, expressed as a percentage mass fraction is given by Equation (1):

$$\omega_{H_2O,ad} = \frac{m_2 - m_3}{m_2 - m_1} \times 100 \quad (1)$$

where

m_1 is the mass, expressed in grams, of the empty dish plus cover;

m_2 is the mass, expressed in grams, of the dish plus cover plus coke before heating;

m_3 is the mass, expressed in grams, of the dish plus cover plus coke after heating.

Report the result, as the mean of duplicate determinations, to the nearest 0,1 % mass fraction.

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9 Precision

9.1 Repeatability limit

The results of duplicate determinations (carried out over a short period of time, but not simultaneously) in the same laboratory, by the same operator, with the same apparatus on two representative portions taken from the same analysis sample, should not differ by more than the values shown in Table 1.

9.2 Reproducibility limit

Since the humidity conditions in different laboratories vary, it is not practical to quote a limiting value for reproducibility.

Table 1 — Precision of moisture determination

Maximum acceptable differences between results	
Repeatability limit	**Reproducibility limit**
0,2 % absolute	See 9.2

10 Test report

The test report shall include the following information:

a) reference to this International Standard, i.e. ISO 687;

b) identification of the sample tested;

c) results of the determination;

d) date of the determination.

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