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Edition 1 and nat. amdt 1

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Edition 2

Any reference to SABS ISO 502 is deemed
to be a reference to this standard
(Government Notice No. 1373 of 8 November 2002)

SOUTH AFRICAN NATIONAL STANDARD

Coal — Determination of caking power — Gray-King coke test

This national standard is the identical implementation of ISO 502:1982 and is adopted with the permission of the International Organization for Standardization.

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Table of changes

Change No.	Date	Scope
Nat. amdt 1	2007	Amended to change the designation from SABS to SANS, with no technical changes.

National foreword

This South African standard was approved by National Committee StanSA SC 5140.20B, *South African committee for solid mineral fuels – Test methods*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in September 2007. This SANS document supersedes SABS ISO 502:1982 (edition 1).

International Standard 502

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Coal — Determination of caking power — Gray-King coke test

Charbon — Détermination du pouvoir agglutinant — Essai Gray-King

Second edition — 1982-02-15

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Descriptors : coal, tests, caking, carbon electrodes, determination, bulk density.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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 502 was developed by Technical Committee ISO/TC 27, *Solid mineral fuels*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 502-1974), which had been approved by the member bodies of the following countries :

Australia	India	Romania
Austria	Italy	South Africa, Rep. of
Belgium	Japan	Spain
Brazil	Netherlands	Switzerland
Chile	New Zealand	Turkey
Czechoslovakia	Philippines	United Kingdom
Denmark	Poland	USSR
Germany, F.R.	Portugal	Yugoslavia

The member body of the following country had expressed disapproval of the document on technical grounds :

France

Printed in Switzerland

INTERNATIONAL STANDARD ISO 502-1982 (E)

Coal — Determination of caking power — Gray-King coke test

0 Introduction

The purpose of the Gray-King coke test, which is one of the parameters adopted for the International Classification of Hard Coal by Type by the United Nations Economic Commission for Europe, is to assess the caking properties of a type of coal or a blend of coals by carbonizing under standard conditions.

Although the Gray-King test and the Roga test both assess the caking properties of a coal, they do not measure precisely the same parameters and should not be regarded as alternative methods.

1 Scope and field of application

This International Standard specifies a method of assessing the caking power of coal under standard conditions.

2 Reference

ISO 1014, *Coke — Determination of true relative density, apparent relative density and porosity.*

3 Principle

The sample is heated under standard conditions to a final temperature of 600 °C. The coke residue obtained is classified by reference to a series of standard residues. If the coke residue produced is so swollen that it fills the cross-section of the retort tube, the determination is repeated with the coal admixed with a suitable quantity of electrode carbon or equivalent material. For these highly swelling coals, the Gray-King coke type is defined by the minimum amount of electrode carbon required to produce a strong hard coke residue of the same volume as the original coal and electrode carbon mixture.

4 Reagent

4.1 Standard electrode carbon (see 10.1)

High temperature electrode carbon :

Moisture	less than 1 %
Volatile matter	less than 1,5 %
Ash	less than 5 %
Bulk density at 25 °C (see the annex)	1,00 to 1,05 g/cm^3
Relative density at 25 °C (see 10.2)	2,05 to 2,09

Size analysis :

Retained on 212 µm test sieve	nil
Through 212 µm test sieve, retained on 125 µm test sieve	less than 26 %
Through 125 µm test sieve, retained on 63 µm test sieve	10 to 40 %
Through 63 µm test sieve	50 to 85 %

5 Apparatus

5.1 Furnace, horizontal electric, 50 mm internal diameter and 300 mm long, with one end closed and the other carrying a plug of insulating material which is bored centrally with a hole 25 mm in diameter. The winding of the furnace shall be such that the middle 200 mm is at a uniform temperature within ± 5 °C at both 300 and 600 °C. Alternatively, the furnace may be constructed from an electrically-heated aluminium-bronze block, with one or several bores of 25 mm diameter. The furnace shall be insulated and located in a cover of metal or other suitable material, and shall be equipped with a suitable thermocouple, lying above the retort tube when the latter is in position and with the junction at the centre of the furnace. An indicator shall be provided for showing the furnace temperature with an accuracy of ± 5 °C. A suitable means of controlling the energy input shall also be provided to permit an increase in temperature at a rate of 5 °C/min. A multiple tube furnace to allow simultaneous determinations is convenient. The furnace may be of the fixed type or mounted on rails. Suitable furnaces are shown in figures 2 and 3.

5.2 Retort tube (see figure 4) : A heat-resistant glass or transparent silica tube, 20 mm internal diameter and 300 mm long, closed at one end, with a side arm, 8 mm internal diameter and 50 mm long, sealed in at a distance of about 20 mm from the open end. The tube shall be smooth and either of uniform bore, or with a slight taper (19 mm to 21 mm) such that the open end is the larger.

5.3 Distance rod, with a flat disk at one end to assist in the packing of the coal and to indicate the free end of the coal sample in the retort tube.