Third edition
2009-10-01

Methods for the petrographic analysis of coals —

Part 5:
Method of determining microscopically the reflectance of vitrinite

Méthodes d'analyse pétrographique des charbons —

Partie 5: Détermination au microscope du pouvoir réflecteur de la vitrinite

Reference number
ISO 7404-5:2009(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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 7404-5 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*.

This third edition cancels and replaces the second edition (ISO 7404-5:1994), which has been technically revised.

ISO 7404 consists of the following parts, under the general title *Methods for the petrographic analysis of coals*:

— *Part 1: Vocabulary*[1)]

— *Part 2: Methods of preparing coal samples*

— *Part 3: Method of determining maceral group composition*

— *Part 4: Method of determining microlithotype, carbominerite and minerite composition*[1)]

— *Part 5: Method of determining microscopically the reflectance of vitrinite*

1) Parts 1 and 4 of this International Standard will be available under the original title, *Methods for the petrographic analysis of bituminous coal and anthracite*, until the revisions of these documents have reached the stage at which they are publicly available.

Introduction

Petrographic analyses have been recognized internationally as important in the context of the genesis, vertical and lateral variation, continuity, metamorphism and usage of coal. The International Committee for Coal and Organic Petrology (ICCP) has made recommendations concerning nomenclature and analytical methods and has published a comprehensive handbook that is continuously updated. The text of this part of ISO 7404 agrees substantially with the text of the handbook and incorporates many useful comments made by members of the ICCP and by member bodies of ISO/TC 27, *Solid mineral fuels*.

Petrographic analyses of single seam coals provide information about the rank, the maceral and microlithotype compositions and the distribution of minerals in the coal. The reflectance of vitrinite is a useful measure of coal rank and can provide information on the distribution of coals of different rank in a coal blend. Together with a maceral group analysis, it provides information about some important chemical and technological properties of the coal and the coal blend. The reflectance of vitrinite has various other applications, such as the characterization of bulk samples and cargoes. For coal blends, the measurement of the vitrinite reflectance profile can permit the identification of the component coals and permit the estimation of the relative abundance of the component coals within the blend.

ISO 7404 (all parts) is concerned with the methods of petrographic analysis currently employed in characterizing coal in the context of their technological use.

The method of determining the reflectance of vitrinite is applicable for low-, medium- and high-rank coals [7].

The properties of a given coal are determined by the proportions and associations of the macerals and minerals present (see ISO 7404-3 [3]) and by the rank of the coal and thus its type, grade and rank. The reflectance of the vitrinite in the coal can be used as an indicator of rank, independent of the petrographic composition. Vitrinite reflectance increases progressively with rank.

The reflectances of the macerals of the vitrinite group can vary significantly in a single coal seam and therefore the value of the reflectance obtained depends also on the choice of the macerals used for measurement. Reflectance measurements are made on one or more of the macerals of vitrinite and, in reporting the results, it is necessary to specify the macerals on which the measurement were made and the proportions of the overall value contributed by each of the macerals measured. Consequently, a vital step in the measurement of vitrinite reflectance is the identification of vitrinite and its various macerals or maceral varieties. For this purpose, reference can be made to ISO 7404-1 and the ICCP [1] handbook.

For rank determination of single-seam coals, normally the reflectance of collotelinite (eu-ulminite [6] in lignites, the equivalent of low-rank B and C [6]) is determined. In cases where collotelinite (or in low-rank coals, eu-ulminite) is not present in sufficient amounts, reflectance analysis on other vitrinite macerals is performed. Reflectance analysis on various vitrinite macerals can also be applied for technological purposes and to coal blends; see 8.3.1. The reflectance value obtained also depends on whether maximum or random reflectance measurements are made, so it is necessary to specify the type of measurement. All of these analysis procedures are applicable to single-coal seams or to blends providing that adequate (see 8.3.1) reflectance measurements are made in compliance with an unbiased sampling procedure on a representative sample.

An accreditation programme for vitrinite reflectance analysis of single-seam coals (SCAP) is run regularly by the ICCP for accrediting petrologists.

NOTE As this edition of ISO 7404 covers coals of all rank, the term “vitrinite” as used in this part of ISO 7404 includes vitrinite as well as huminite. Reference can be made to ISO 7404-1 for details. The equivalent to collotelinite in lignites is ulminite B. Reflectance measurement on lignites is performed on huminite.