
**Hard coal — Determination of caking
index**

Houille — Détermination de l'indice d'agglutination

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 15585:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

- Change to test precision (both for repeatability, r , and reproducibility, R) resulting from ILS conducted in 2016 and 2017.
- Additional information provided on anthracite sample packing and homogeneity test in [Annex A](#) and standard deviation formula and flowchart for standard anthracite sample taking in [Annex B](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Caking index is a key parameter to identify the caking power of hard coal, which is a measurement of the agglutinating strength between the coal particles and inert constituents after heating without the contact of air. Coal caking characteristic is important and widely used in coking, gasification, liquefaction and combustion industries.

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Hard coal — Determination of caking index

1 Scope

This document specifies a method of determination of caking index of hard coal. It is applicable to the evaluation of caking power of bituminous coal with random reflectance of vitrinite, R_v , greater than 0,6 % and less than or equal to 1,8 % ($>0,6$ % and $\leq 1,8$ %).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 caking index

measure of the magnitude of the binding strength between coal particles or between coal particles and inert particles after coal is heated at 850 °C

4 Principle

A portion of prepared sample of coal of limited size range and the standard anthracite are mixed under defined conditions, and the mixture is carbonized rapidly. The crucible coke thus obtained is tested for strength in a drum conforming to certain specifications. The caking power of the test sample is expressed by the abrasive strength, i.e. resistance to breakage of the crucible coke.

5 Reagent and materials

5.1 Standard anthracite, having a moisture of less than 2,5 % in mass fraction, air-dried basis, an ash of less than 4 % in mass fraction, dry basis and a volatile matter of less than 8 % in mass fraction, dry, ash free basis. The size limits are 0,1 mm to 0,2 mm. The undersize content of 0,1 mm should not be more than 6 % in mass fraction, and the oversize content of 0,2 mm should not be more than 4 % in mass fraction.

NOTE [Annexes A](#) and [B](#) provide information on the extraction, preparation and testing of standard anthracite.

6 Apparatus

6.1 Balance, analytical balance with a resolution of at least 0,1 % relative of the test portion mass.

6.2 **Crucible**, porcelain, having the following dimensions (see [Figure 1](#)):

- a) external diameter at the top: 40 mm ± 1,5 mm;
- b) internal diameter at the base: 20 mm ± 1,5 mm;
- c) external height: 40 mm ± 1,5 mm;
- d) wall thickness: less than 2 mm.

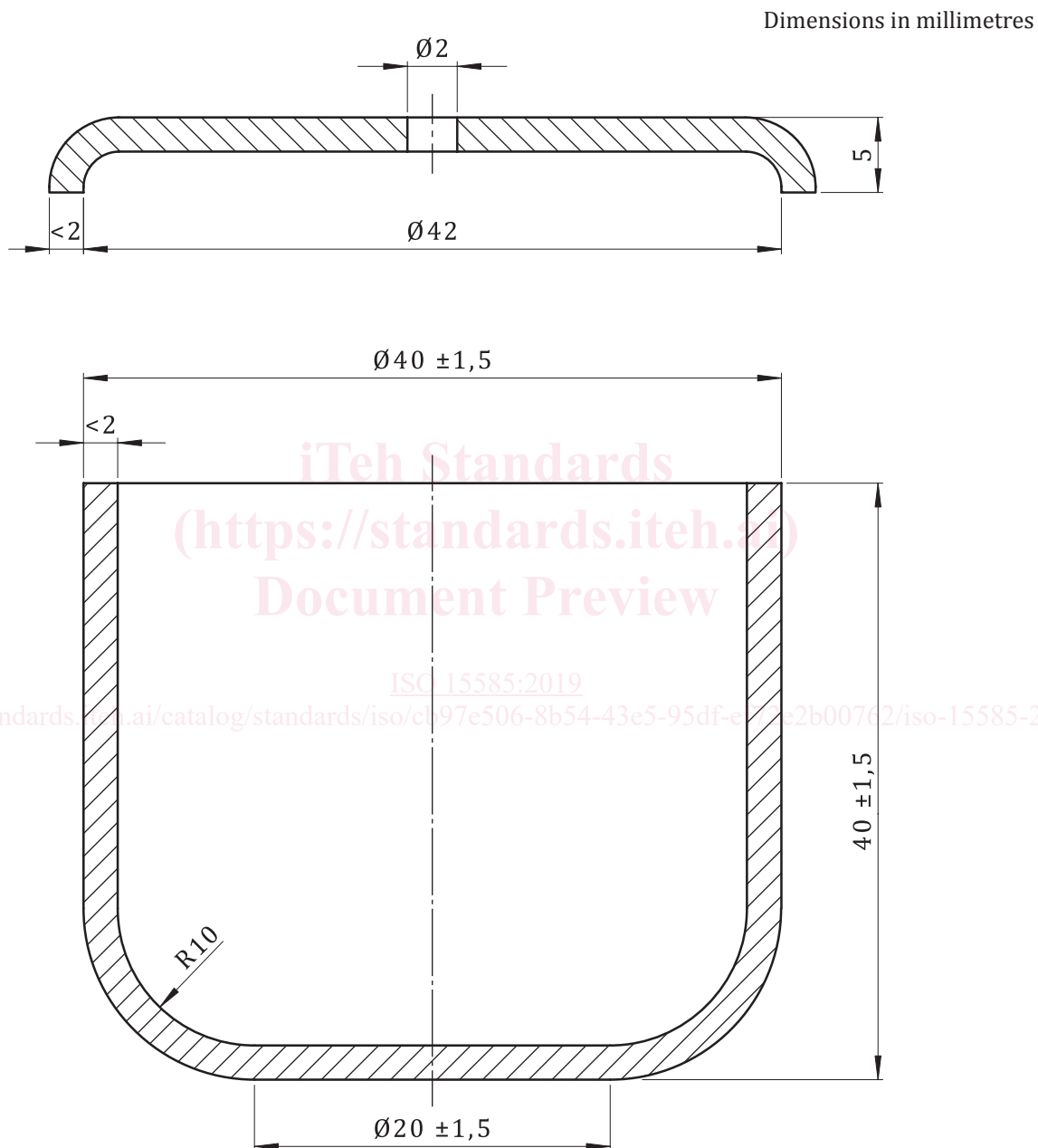


Figure 1 — Crucible and lid

6.3 **Lid**, porcelain, 1,5 mm to 2,0 mm thick, with a hole 2 mm in diameter in the centre (see [Figure 1](#)).

6.4 **Stirrer**, made of 1,0 mm to 1,5 mm diameter metal wire, having an 8 mm loop at one end (see [Figure 2](#)).

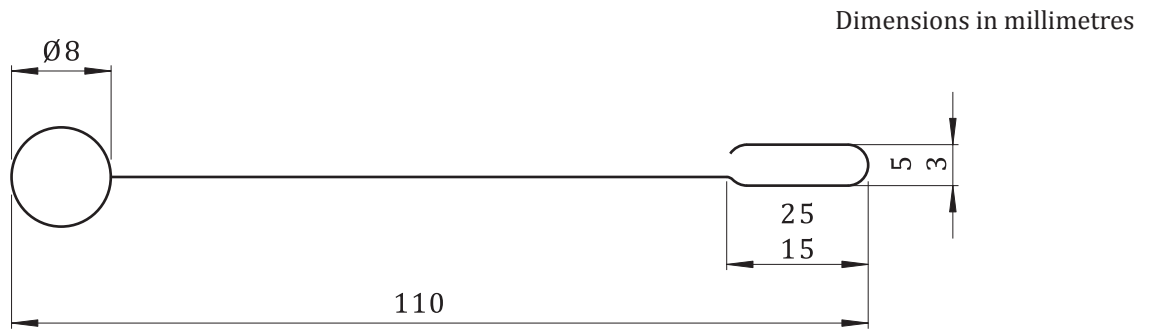


Figure 2 — Stirrer

6.5 Heat resistant weight, composed for example of Nichrome steel¹⁾, with a mass of 110 g to 115 g (see Figure 3).

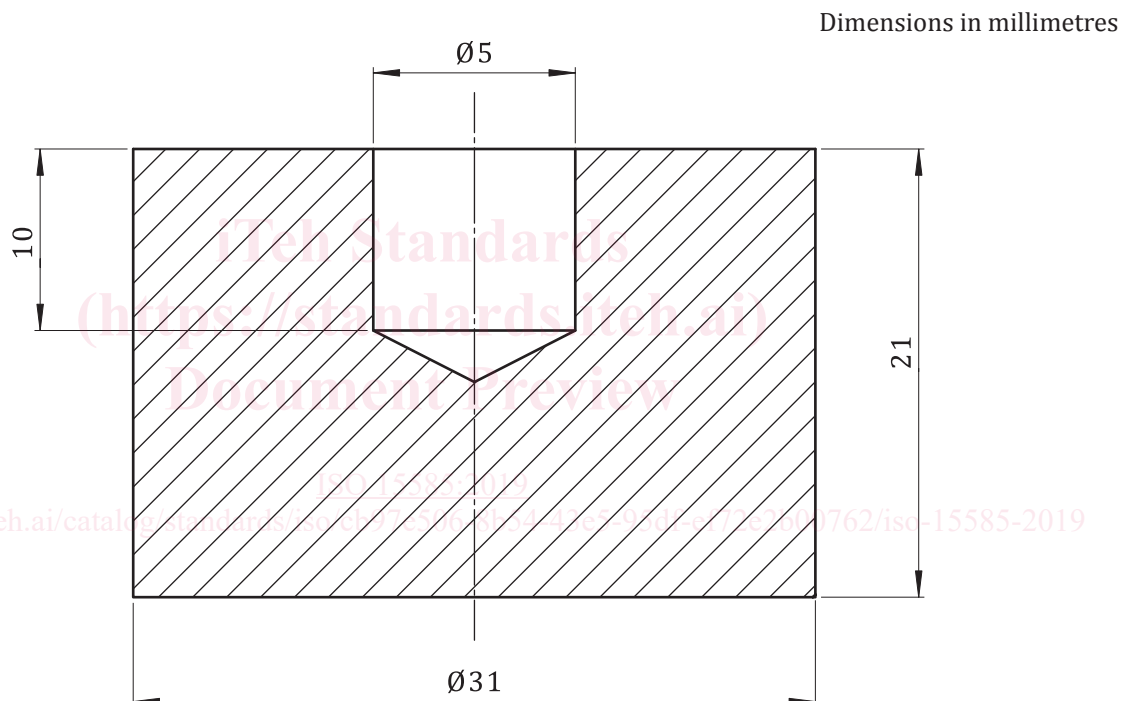
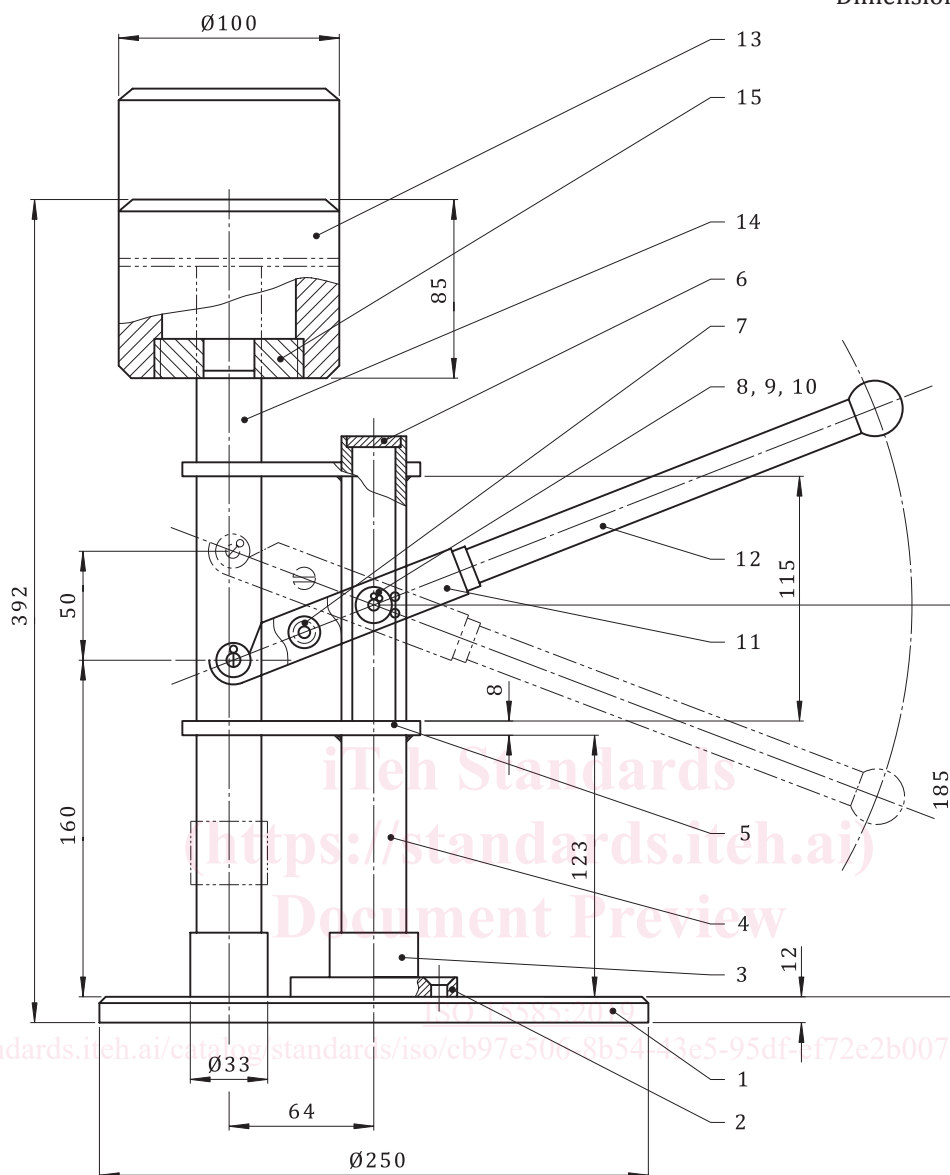


Figure 3 — Heat resistant weight

6.6 Press, for compressing the mixture of coal and standard anthracite under a weight having a 6 kg mass (see Figure 4).

1) Nichrome is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

Dimensions in millimetres



Key

- | | | |
|--------------------|-----------------|----------------------------|
| 1 bottom plate | 6 dead plate | 11 carriage |
| 2 screw | 7 back-up shaft | 12 hand knob |
| 3 round base | 8 small shaft | 13 press |
| 4 steel tube | 9 dump | 14 lighting vertical shaft |
| 5 connecting board | 10 forelock | 15 plug |

Figure 4 — Press used for compressing the mixture of anthracite and test coal

6.7 Electric furnace, with a zone of uniform temperature and a temperature control device capable of maintaining that zone at $850\text{ °C} \pm 10\text{ °C}$.

6.8 Drum, with a cover, driving shaft, transmission gear and electric motor for carrying out the abrasion test on coke.

The drum (see [Figure 5](#)) has a 200 mm internal diameter, is 70 mm deep and is made of 3 mm thick sheet iron. To the inside walls are welded two symmetrical sheet iron strips 70 mm long, 30 mm wide