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Carbonaceous materials used in the production of aluminium — Green and calcined coke — Determination of ash content

Produits carbonés utilisés pour la production de l'aluminium — Coke cru et coke calciné — Détermination du taux de cendres

Reference number
ISO 8005:2005(E)

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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 8005 was prepared by Technical Committee ISO/TC 226, *Materials for the production of primary aluminium*.

This second edition cancels and replaces the first edition (ISO 8005:1984), which has been technically revised.

Introduction

The content of ash or inorganic materials in coke is an important property, as ash will accumulate in the electrolyte when the coke is used for anodes. Constant ash content may also be an indication that the same raw materials are used.

Carbonaceous materials used in the production of aluminium — Green and calcined coke — Determination of ash content

1 Scope

This International Standard specifies a method for the determination of ash in green and calcined coke used in the production of aluminium.

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 6375, *Carbonaceous materials for the production of aluminium — Cokes for electrodes — Sampling*

ASTM Practice E691–99, *Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method*

3 Principle

Heating of a test portion of a dry, finely ground sample in a tared dish in a furnace at 700 °C, to constant mass.

4 Apparatus

4.1 Jaw crusher, or another suitable crusher, faced with a very hard alloy that will not be abraded and therefore will not contaminate the sample.

4.2 Pestle and mortar, or a suitable mill, of hard material that will not be abraded and therefore will not contaminate the sample.

Suitable materials are agate, tungsten or silicon carbide. Porcelain should not be used.

4.3 Sieve, 750 µm.

4.4 Laboratory balance.

4.5 Desiccator, containing a drying agent (e.g. activated alumina or molecular sieves).

4.6 Platinum dish, of capacity 50 ml to 60 ml, diameter about 65 mm to 72 mm, height about 15 mm; or an appropriate porcelain dish.

4.7 Oven, capable of maintaining a temperature of (105 ± 5) °C.

4.8 Electric furnace, capable of being controlled at (700 ± 10) °C, with an adequate air circulation.

5 Sampling and sample

Sample in accordance with ISO 6375.

6 Procedure

6.1 Preparation of the test sample

Use any suitable means to crush a representative portion of the material (Clause 5) to approximately 25 mm or smaller size and dry until it is totally dry [e.g. at (105 ± 5) °C for 3 h]. Further crush the dry material, by means of the crusher (4.1), to approximately 6 mm or smaller size.

Thoroughly mix the dried crushed material; reduce it by quartering to a test sample of at least 50 g.

Grind the entire 50 g test sample with the pestle and mortar or in a mill (4.2) to such a fineness that it all passes through the 750 µm sieve (4.3).

6.2 Test portion

6.2.1 Heat the platinum or porcelain dish (4.6) for 1 h in the furnace (4.8), controlled at (700 ± 10) °C, allow it to cool to ambient temperature in the desiccator containing the drying agent (4.5) and weigh to the nearest 0,000 2 g.

6.2.2 Weigh, to the nearest 0,000 2 g, a test portion of about 20 g of the dry, sieved test sample (6.1), or a quantity sufficient to provide a minimum of 0,020 g of ash, in the previously tared dish (6.2.1).

6.3 Determination

6.3.1 Place the dish containing the test portion (6.2.2) into the cold furnace (4.8) and raise the temperature of the furnace to (700 ± 10) °C.

Gradually heat to redness at such a rate as to avoid mechanical loss (in the case of green coke, this prevents a too rapid expulsion of volatile matter).

Maintain at (700 ± 10) °C overnight, or for an adequate time to completely burn off the carbonaceous matter in the test portion. Remove the dish containing the ash from the furnace and cool it to room temperature in the desiccator containing the drying agent (4.5).

6.3.2 Weigh the dish and ash as rapidly as possible; replace them in the furnace and repeat heating, cooling and weighing until the mass of the dish and contents does not differ by more than 0,000 5 g for two consecutive weighings.

7 Expression of results

7.1 Method of calculation

The ash content, expressed as a percentage by mass, w_a, is given by the formula:

$$w_a = (m_2 - m_1) \times \frac{100}{m_0}$$

where

m_0 is the mass, in grams, of the test portion (6.2.2);

m_1 is the mass, in grams, of the empty dish (6.2.1);

m_2 is the mass, in grams, of the dish containing the ash (6.3.2).