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Aluminium oxide primarily used for the production of aluminium — Preparation and storage of test samples

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Contents

Page

Foreword

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

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.

Aluminium oxide primarily used for the production of aluminium — Preparation and storage of test samples

1 Scope

This document describes methods for the sample preparation of smelter-grade aluminium oxide. It covers the reduction of a bulk sample between 1 kg and 20 kg to produce a sample that is suitable for chemical and physical analysis. The reduced sample produced will be representative of the initial bulk sample. The bulk sample is considered to be from one source.

The methods are suitable for dry, free-flowing aluminium oxide.

As the moisture content will influence many physical analyses, the method aims to minimize the exposure of the sample to the atmosphere to avoid water absorption.

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
increment
quantity of material collected in a single operation of a sample device

3.2
sample preparation
process of preparing the sample for analysis or testing, which may involve air-drying, particle size reduction, mixing and division, and may be performed in several stages

3.3
sample preparation stage
stage in the sample preparation sequence of operations that may consist of sample drying, reduction in particle size or mixing, and which culminates in sample division

Note 1 to entry: The completion of each operation of sample division defines the commencement of the next sample preparation stage. Thus, the number of stages in sample preparation is equal to the number of divisions made.

4 Principle

The bulk sample is mixed using a rotary splitter and the sample reduced to the desired size, then further divided by rotary splitting into appropriately sized portions suitable for the analyses required.

5 Apparatus

5.1 Rotary splitter

Hopper, chute and sample containers should be made of a material which will not affect analytical results. Stainless steel is recommended. For large bulk samples, the sample receivers should have a capacity of up to 2 kg and the splitter should have a minimum of eight of these receivers. The splitter shall be configured so as to minimize loss of fine particles during operation; this is achieved by minimizing the fall distance of the aluminium oxide as it is fed onto the dividing plate and having a good seal between the sample receiver and the dividing plate exit. An example of a rotary splitter is shown in Annex A.

If the proportion of particles passing a 20 micron sieve is to be determined on a split portion, then test work to ensure that no more than 0,2% of less than 20 micron particles (referred to as "fines") are lost over the total sample division process shall be conducted.

5.2 Laboratory top-pan balance

Capable of weighing 4 kg to the nearest 1 g.

5.3 Sample bottles/containers

Of a sturdy plastic construction with an airtight screw-top lid. Sample containers shall be clean and dry. These containers should not have been used for storing any other material.

5.4 Small rotary splitter

Hopper, chute and sample containers should be made of a material which will not affect analytical results. Stainless steel is recommended. The sample receivers should have a capacity of up to 250 g and the splitter should have a minimum of eight of these receivers. If the material hopper discharges onto a chute, mechanical vibration will be required to assist flow of the aluminium oxide along the chute.

5.5 Brush

For brushing out residual aluminium oxide in containers.

5.6 Powder funnel

Suitable for specific mass of aluminium oxide to be transferred into a bottle/container (5.3).

6 Procedure

6.1 Sample integrity

It is important that, as far as is practicable, sample loss is minimized during the sample preparation stages. All equipment should be thoroughly cleaned before use. It is preferable to keep equipment and work areas solely for aluminium oxide preparation to avoid contamination. If a dust extraction or air-conditioning system is in use where splitting is performed, ensure that airflow is not sufficient to disturb the aluminium oxide while it is being processed.

Minimizing the time the sample is exposed to air will reduce the risk of dust and moisture contamination. Work quickly and limit the time the sample is left in the splitter prior to it being placed in sample containers. An increase in moisture will occur during the sample preparation process; this will impact on the material's loss of mass at 300 °C and, to a minor extent, 1 000 °C.