
**Carbonaceous materials used in the
production of aluminium — Cathode
— Cathode abrasion testing**

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Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Apparatus	1
6 Sampling	1
7 Procedure	2
8 Calculation	2
9 Precision	2
10 Test report	2

Foreword

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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 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.

Introduction

Wear of carbon lining materials is encountered in any application in which there are moving parts. Abrasive wear is the process whereby a hard-rough surface contacts and moves over another surface, so that one or both are subjected to attrition. This effect is of importance to cathodes as it may reduce the life of an aluminium pot.

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Carbonaceous materials used in the production of aluminium — Cathode — Cathode abrasion testing

1 Scope

This document specifies a method for the determination of the resistance to physical abrasion of a cathode sample.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8007-1, *Carbonaceous materials used in the production of aluminium — Sampling plans and sampling from individual units — Part 1: Cathode blocks*

3 Terms and definitions

No terms and definitions are listed in this document.

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/>

4 Principle

A cathode core sample is placed in a grinding or polishing apparatus equipped with abrasive paper for 30 s or 60 s, depending on the cathode grade. The opposite direction of rotation of the head and the base of the apparatus causes the sample to be abraded. The height of the sample is measured before and after the test and then the abrasion is calculated from the loss of sample height. The result is given in per cent.

5 Apparatus

5.1 Caliper, with a measuring range of 0 mm to 150 mm and an accuracy of 20 µm for dimensions ≤ 100 mm.

5.2 Grinding or polishing apparatus, equipped with a sample holder and a powerhead. It should be capable of maintaining the abrasive disc speed at 200 rpm and the head speed at 100 rpm. The head force applied on each sample is 50 N.

5.3 Abrasive disc, silicon carbide SiC type, grit size 60.

6 Sampling

Sample the cathode blocks in accordance with ISO 8007-1. In order to achieve representative test results, a core sample with diameter $(50 \pm 0,2)$ mm and length $(20 \pm 0,2)$ mm shall be taken.

7 Procedure

- Measure the core height, rounded to the nearest 0,01 mm.
- Set the speed of the abrasive disc to 200 rpm, the speed of the head to 100 rpm and the pressure applied on the sample to 50 N.
- Place the core sample in the sample holder and start the abrasion test. The total test duration should be set at 30 s for 100 % graphite and graphitized grades and at 60 s for all other samples.
- Measure the sample height after grinding.

8 Calculation

Calculate the abrasion (A), in per cent, according to [Formula \(1\)](#):

$$A = \frac{l_1 - l_2}{l_1} \times 100 \quad (1)$$

where

A is the abrasion (%);

l_1 is the core height before the test (mm);

l_2 is the core height after the test (mm).

9 Precision

Values are not yet available since no interlaboratory comparison was carried out.

10 Test report

The test report shall include the following information:

- an identification of the sample;
- a reference to this document i.e. ISO 22731:2020;
- the method used (if the standard includes several);
- the date of the test;
- the test result(s);
- any deviations from the procedure, including agreed conditions deviating from the procedure and any unusual features observed.