

---

---

**Aluminium oxide used for the production  
of primary aluminium — Particle size  
analysis for the range 45 µm to 150 µm —  
Method using electroformed sieves**

*Oxyde d'aluminium utilisé pour la production d'aluminium primaire —  
Analyse granulométrique dans la gamme 45 µm à 150 µm — Méthode  
par emploi de tamis électroformés*

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

[ISO 2926:2005](https://standards.iteh.ai/catalog/standards/sist/acef58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005)

[https://standards.iteh.ai/catalog/standards/sist/acef58a1-af49-4a98-b444-  
b64b418b1187/iso-2926-2005](https://standards.iteh.ai/catalog/standards/sist/acef58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005)



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 2926:2005](https://standards.iteh.ai/catalog/standards/sist/acef58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005)

<https://standards.iteh.ai/catalog/standards/sist/acef58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005>

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## 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 2926 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 2926:1974), which has been technically revised to reflect modern industry practice, and has substantially improved accuracy and precision over the first edition. The major changes are:

- the mandatory use of electroformed sieves instead of woven wire sieves;
- the mandatory use of a sieve shaker with a vertical hammer-drop action concurrent with the lateral sieving action;
- a different set of nominal aperture sizes to correspond to modern industry practice;
- weighing of fractions "on-sieve" rather than "off-sieve";
- changed sample preparation (no pre-drying);
- removal of the limit of 50 % atmospheric relative humidity;
- calculation of percentages using a "mass recovered" denominator rather than "original mass".

## Introduction

This International Standard is based on AS 2879.6-1995 prepared by Standards Australia.

# iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 2926:2005](https://standards.iteh.ai/catalog/standards/sist/aecf58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005)

<https://standards.iteh.ai/catalog/standards/sist/aecf58a1-af49-4a98-b444-b64b418b1187/iso-2926-2005>

# Aluminium oxide used for the production of primary aluminium — Particle size analysis for the range 45 µm to 150 µm — Method using electroformed sieves

## 1 Scope

This International Standard specifies a dry sieve method using electroformed sieves for determining the mass distribution of the particle sizes in aluminium oxide used for the production of primary aluminium.

This method is applicable to calcined aluminium oxide containing a maximum of 20 % mass fraction of particles having a mean diameter exceeding 150 µm, and containing a maximum of 15 % mass fraction of particles having a mean diameter less than 45 µm.

This method is not applicable to the use of woven wire sieves.

## 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 3310-3, *Test sieves — Technical requirements and testing — Part 3: Test sieves of electroformed sheets*

## 3 Principle

A test portion of the crude sample is sieved mechanically through electroformed sieves.

Each of the separate fractions is weighed on the sieve, and a cumulative mass of material retained on each sieve aperture size is calculated.

## 4 Apparatus

### 4.1 Test sieves, each including a sieving medium (screen) and a frame.

The frames shall be cylindrical, having nominal diameters of 200 mm and heights between 50 mm and 75 mm. A lid and a bottom receiver shall be included. The sieves, lid and bottom receiver shall be capable of being fitted together tightly to form a series of test sieves<sup>1)</sup>.

The screens shall be constructed of smooth electroformed sheet having square openings. The aperture tolerances shall be in accordance with ISO 3310-3.

---

1) Certified electroformed sieves manufactured by Bukbee-Meers of St Paul, Minnesota, USA, are examples of suitable products available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of these products.

The sieve apertures shall have nominal sizes of 150 µm, 106 µm, 75 µm, 53 µm and 45 µm.

**4.2 Mechanical sieve shaker**, capable of clamping the sieves mounted inside each other together with the top lid and bottom receiver to form a vertical assembly.

The apparatus<sup>2)</sup> shall impart to the sieve assembly a simultaneous horizontal rotary motion and a vertical tapping action resulting from the fall of a hammer. This combined action shall cause sufficient displacement of the aluminium oxide particles to prevent aggregation but not cause any deformation of the sieving screen or any size reduction of the aluminium oxide particles through shock or abrasion.

**4.3 Laboratory top pan balance**, capable of weighing the sieves to the nearest 0,01 g.

The balance may be fitted with a lightweight frame mounted on the weighing pan to enable direct weighing of test sieves and receiver.

**4.4 Ultrasonic bath**, of sufficient capacity to immerse one test sieve fully in a vertical plane to prevent cavitation damage to the sieve sheet.

## 5 Procedure

### 5.1 Sample preparation

Split the sample into test portions by riffing or rotary sample division until the required mass is obtained.

Weigh the final split to the nearest 0,01 g. The mass ( $m_0$ ) of the final split should fall in the range 30 g to 50 g.

### 5.2 Preparation of test sieves

Prepare the test sieves as follows.

- a) Clean each test sieve (4.1) in turn by immersing it vertically in distilled water in the ultrasonic bath (4.4). A non-corrosive wetting agent may be used. Cleaning times of between 15 s and 20 s are adequate. Longer times may cause damage to the sieve screen.
- b) After immersion, rinse each sieve with distilled water and dry in a laboratory oven at 100 °C. Ensure that the sieves are thoroughly dry.
- c) Cool to room temperature and weigh each sieve (masses  $m_1$ ) on the top pan balance (4.3) to the nearest 0,01 g. Similarly weigh the bottom receiver.

### 5.3 Determination

Determine the size distribution as follows.

- a) Assemble the test sieves (4.1) on the mechanical sieve shaker (4.2) in order of increasing aperture size from bottom to top, starting with the bottom receiver.
- b) Spread the test portion (5.1) on the top-most sieve. Close with the tightly fitting lid and install the positioning cover. Lower the hammer onto the cover.
- c) Switch on the mechanical sieve shaker and allow it to operate for 30 min.

---

2) RO-TAP Testing sieve shakers, (W. S. Tyler Inc., Mentor, Ohio, U.S.A.), operated in accordance with the manufacturer's recommended settings, are examples of suitable products available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of these products.

- d) Remove the sieve stack, and weigh each sieve and its contents to the nearest 0,01 g (masses  $m_2$ ).
- e) Similarly weigh the bottom receiver and contents.
- f) Clean the sieves in preparation for the next test sample as follows. Invert each sieve over a suitable container, brush the underside lightly to remove entrapped particles and tap the sieve frame lightly to remove any adhering particles.

## 6 Calculation of results

Calculate the results as follows:

- a) Calculate the masses of each retained sample from the following equation:

$$m_3 = m_2 - m_1 \quad (1)$$

where

$m_3$  is the mass of retained sample, in grams;

$m_2$  is the mass of test sieve plus retained sample, in grams;

$m_1$  is the mass of test sieve, in grams.

In the case of the sample collected in the bottom receiver,  $m_1$  is the mass of the bottom receiver and  $m_2$  is the mass of the bottom receiver plus contents.

- b) Calculate the cumulative mass  $m_4$  for each sieve size.

- c) Calculate the mass recovered  $m_5$  using the following equation:

$$m_5 = \sum m_3 \quad (2)$$

where  $m_3$  is the mass of sieve contents for each sieve and the bottom receiver.

If the mass  $m_5$  exceeds the mass of the original test portion ( $m_0$ ) by more than 0,5 g, or if  $m_5$  is less than  $m_0$ , then another test portion should be analysed. Due to absorption of moisture during the test, some increase in mass is normal. Any loss in mass is most likely caused by physical loss of sample.

- d) Calculate, to two decimal places, the cumulative percent final mass  $m_6$  for each sieve aperture size, using the following equation:

$$m_6 = \frac{m_4}{m_5} \times 100$$

- e) Prepare a table of values of  $m_6$  corresponding to each successive nominal aperture size. Report each value of  $m_6$  to one decimal place.

NOTE 1 It can be useful to plot a cumulative distribution curve of the mass passing through each sieve, expressed as a percentage, against the corresponding nominal aperture size, in order of decreasing aperture size.

NOTE 2 Annex A gives an example of a calculation (Table A.1) and reporting (Table A.2) of size analysis

## 7 Test report

The test report shall include the following information:

- a) the table of cumulative percent mass retained for each nominal aperture size ( $m_6$  values), expressed as percent mass fraction of the original sample;
- b) reference to this International Standard, i.e. ISO 2926:2005;
- c) any unusual features noted during the determination and any operation not included in this International Standard which may have affected the results.

## 8 Precision

The values for repeatability and reproducibility should not exceed those given in Table 1.

**Table 1 — Precision for size analysis**

Percentage by mass (absolute)

Sieve fraction	Repeatability	Reproducibility
	<i>r</i>	<i>R</i>
+ 150 µm	1,2	1,7
+ 106 µm	1,2	8,2
+ 75 µm	0,9	2,0
+ 53 µm	0,5	2,9
+ 45 µm	0,2	0,9

The results of the test programme from which these values were derived are presented in Annex B.



## Annex A (informative)

### Example of calculation of size analysis

Table A.1 — Example of calculation of size analysis

Sieve aperture or pan  $\mu\text{m}$	Mass of sieve or pan  $m_1$ g	Sieve mass + mass retained  $m_2$ g	Mass retained  $m_3$ g	Cumulative mass  $m_4$ g	Retained cumulative  $m_6$ %
150	411,06	412,49	1,43	1,43	3,76
106	435,93	446,10	10,17	11,60	30,48
75	430,88	446,38	15,50	27,10	71,20
53	427,12	434,60	7,48	34,58	90,86
45	408,80	410,18	1,38	35,98	94,48
Pan	284,62	286,72	2,10		

Initial mass  $m_0 = 37,81$  g. iTeH STANDARD PREVIEW  
 Total mass recovered  $m_5 = 38,06$  g. (standards.iteh.ai)

ISO 2926:2005

<https://standards.iteh.ai/catalog/standards/sist/acef58a1-af19-4a98-b444-b64b418b1187/iso-2926-2005>  
 Table A.2 — Example of reporting size analysis

Sieve fraction	Mass fraction retained (cumulative) %
+150 $\mu\text{m}$	3,8
+106 $\mu\text{m}$	30,5
+75 $\mu\text{m}$	71,2
+53 $\mu\text{m}$	90,9
+45 $\mu\text{m}$	94,5