

# INTERNATIONAL STANDARD



# 903

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Aluminium oxide primarily used for the production of aluminium – Determination of untamped density

*Oxyde d'aluminium principalement utilisé pour la production de l'aluminium – Détermination de la densité apparente*

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**Descriptors** : aluminium oxide, tests, density measurement, bulk density.

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 47 has reviewed ISO Recommendation R 903 and found it technically suitable for transformation. International Standard ISO 903 therefore replaces ISO Recommendation R 903-1968 to which it is technically identical.

ISO Recommendation R 903 was approved by the Member Bodies of the following countries :

Austria	Ireland	Spain
Belgium	Israel	South Africa, Rep. of
Bulgaria	Italy	Sweden
Canada	Japan	Switzerland
Czechoslovakia	Korea, Rep. of	Thailand
Egypt, Arab Rep. of	Netherlands	Turkey
France	New Zealand	United Kingdom
Germany	Norway	U.S.A.
Hungary	Poland	U.S.S.R.
India	Portugal	Yugoslavia
Iran	Romania	

No Member Body expressed disapproval of the Recommendation.

The Member Body of the following country disapproved the transformation of ISO/R 903 into an International Standard :

Egypt, Arab Rep. of

# Aluminium oxide primarily used for the production of aluminium – Determination of untamped density

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the untamped density of aluminium oxide primarily used for the production of aluminium.

## 2 REFERENCES

ISO 802, *Aluminium oxide primarily used for the production of aluminium – Preparation and storage of test samples.*

ISO 2927, *Aluminium oxide primarily used for the production of aluminium – Sampling.*

## 3 PRINCIPLE

Determination of the mass of a known volume of aluminium oxide collected after allowing it to fall freely into a stationary container, avoiding vibration.

Expression of the untamped density by division of this mass by the mass of an equal volume of water.

## 4 APPARATUS

**4.1 Funnel**, of diameter 10 cm and angle 60°, with a stem of length 8 mm and aperture diameter of 6 mm.

**4.2 Cylindrical container**, of capacity approximately 200 ml, with a ratio of internal diameter to internal length 1/6 approximately.

**4.3 Suitable stand and ring support**, to allow the funnel (4.1) to be set to a predetermined height above the top level of the cylindrical container (4.2).

## 5 PROCEDURE

### 5.1 Sample

Use the crude sample (see 3.2 of ISO 802).

### 5.2 Determination

Set the cylindrical container (4.2) on a flat base. Adjust the funnel (4.1) so that its axis coincides approximately with that of the cylinder, with the tip of the funnel at a height of 10 cm above the cylindrical container top.

Feed the aluminium oxide into the centre of the funnel at about 40 mm above the funnel so as not to communicate any vibration to the apparatus, at about 20 to 60 g/min. If blocking occurs at the stem, facilitate the passage of the

aluminium oxide with a piece of wire, taking care not to vibrate the cylindrical container.

Stop the feed when the aluminium oxide has formed a cone above the top level of the cylindrical container and is spilling over.

Remove the cone of surplus aluminium oxide by gently drawing a straight edge across the top rim of the cylindrical container, without communicating any vibration to the latter.

Weigh the cylindrical container and its contents.

## 6 EXPRESSION OF RESULTS

The untamped density is given by the formula

$$\frac{m_2 - m_0}{m_1 - m_0}$$

where

$m_0$  is the mass, in grams, of the empty cylindrical container (4.2);

$m_1$  is the mass, in grams, of the cylindrical container full of distilled water;

$m_2$  is the mass, in grams, of the cylindrical container full of aluminium oxide;

If the cylindrical container used has a capacity of exactly 200 ml, the formula for the calculation of untamped density becomes

$$\frac{m_2 - m_0}{200}$$

It will usually be more convenient to use one particular cylindrical container of capacity approximately 200 ml and determine the value of  $(m_1 - m_0)$  to be used in all determinations.

## 7 TEST REPORT

The test report shall include the following particulars :

- the reference of the method used;
- the results and the method of expression used;
- any unusual features noted during the determination;
- any operation not included in this International Standard or in the International Standards to which reference is made, or regarded as optional.

## ANNEX

**ISO PUBLICATIONS RELATING TO ALUMINIUM OXIDE  
PRIMARILY USED FOR THE PRODUCTION OF ALUMINIUM**

- ISO 802 – Preparation and storage of test samples.
- ISO 803 – Determination of loss of mass at 300 °C (conventional moisture).
- ISO 804 – Preparation of solution for analysis – Method by alkaline fusion.
- ISO 805 – Determination of iron content – 1,10-Phenanthroline photometric method.
- ISO 806 – Determination of loss of mass at 1 000 and 1 200 °C.
- ISO 900 – Determination of titanium content – Diantiprylmethane photometric method.
- ISO 901 – Determination of absolute density – Pyknometer method.
- ISO 902 – Measurement of the angle of repose.
- ISO 903 – Determination of untamped density.
- ISO 1232 – Determination of silica content – Reduced molybdosilicate spectrophotometric method.
- ISO 1617 – Determination of sodium content – Flame emission spectrophotometric method.
- ISO 1618 – Determination of vanadium content – *N*-Benzoyl-*N*-phenylhydroxylamine photometric method.
- ISO 2069 – Determination of calcium content – Flame atomic absorption method.
- ISO/R 2070 – Determination of calcium content – Spectrophotometric method using naphthalhydroxamic acid.
- ISO 2071 – Determination of zinc content – Flame atomic absorption method.
- ISO/R 2072 – Determination of zinc content – PAN photometric method.
- ISO 2073 – Preparation of solution for analysis – Method by hydrochloric acid attack under pressure.
- ISO 2828 – Determination of fluorine content – Alizarin complexone and lanthanum chloride spectrophotometric method.
- ISO 2829 – Determination of phosphorus content – Reduced phosphomolybdate spectrophotometric method.
- ISO 2865 – Determination of boron content – Curcumin spectrophotometric method.
- ISO 2926 – Particle size analysis – Sieving method.
- ISO 2927 – Sampling.
- ISO 2961 – Determination of an adsorption index.
- ISO 3390 – Determination of manganese content – Flame atomic absorption method.