



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 14604:2016

Fine ceramics (advanced ceramics, advanced technical ceramics) - Methods of test for ceramic coatings - Determination of fracture strain (ISO 14604:2012)

**I.S. EN ISO 14604:2016**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

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Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN ISO 14604:2016 is the adopted Irish version of the European Document EN ISO 14604:2016, Fine ceramics (advanced ceramics, advanced technical ceramics) - Methods of test for ceramic coatings - Determination of fracture strain (ISO 14604:2012)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**EUROPEAN STANDARD**

**EN ISO 14604**

**NORME EUROPÉENNE**

**EUROPÄISCHE NORM**

April 2016

ICS 81.060.30

Supersedes EN 1071-9:2009

English Version

**Fine ceramics (advanced ceramics, advanced technical  
ceramics) - Methods of test for ceramic coatings -  
Determination of fracture strain (ISO 14604:2012)**

Céramiques techniques - Méthodes d'essai des  
revêtements céramiques - Détermination de la  
déformation à la rupture (ISO 14604:2012)

Hochleistungskeramik - Verfahren zur Prüfung  
keramischer Schichten - Bestimmung der  
Bruchdehnung (ISO 14604:2012)

This European Standard was approved by CEN on 25 March 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**EN ISO 14604:2016 (E)**

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## **European foreword**

The text of ISO 14604:2012 has been prepared by Technical Committee ISO/TC 206 “Fine ceramics” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 14604:2016 by Technical Committee CEN/TC 184 “Advanced technical ceramics” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1071-9:2009.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### **Endorsement notice**

The text of ISO 14604:2012 has been approved by CEN as EN ISO 14604:2016 without any modification.

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# INTERNATIONAL STANDARD

**ISO**  
**23145-2**

First edition  
2012-06-01

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## **Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of bulk density of ceramic powders —**

### **Part 2: Untapped density**

*Céramiques techniques — Détermination de la masse volumique des  
poudres céramiques —*

*Partie 2: Masse volumique sans tassement*



Reference number  
ISO 23145-2:2012(E)

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**ISO 23145-2:2012(E)**



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## ISO 23145-2:2012(E)

### 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 23145-2 was prepared by Technical Committee ISO/TC 206, *Fine ceramics*.

ISO 23145 consists of the following parts, under the general title *Fine ceramics (advanced ceramics, advanced technical ceramics)* — *Determination of bulk density of ceramic powders*:

- *Part 1: Tap density*
- *Part 2: Untapped density*

# Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of bulk density of ceramic powders —

## Part 2: Untapped density

### 1 Scope

This part of ISO 23145 specifies the test method to determine the untapped density of granulated or ungranulated ceramic powders by a constant-volume measuring method.

### 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 565:1990, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 80000-1:2009, *Quantities and units — Part 1: General*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

### 3 Principle

The mass of a known volume of the powder is determined after allowing it to fall freely into a stationary container, avoiding vibration. The mass of the powder divided by its volume after the test gives its untapped density.

### 4 Apparatus

**4.1 Funnel** (Figure 1), of stainless steel, with an orifice of diameter 2,5 mm and the other with an orifice of diameter 5,0 mm. The funnel shall be made of a non-magnetic, corrosion-resistant metallic material such as stainless steel (for example SUS 304) having sufficient wall thickness and hardness to withstand distortion and excessive wear.

**4.2 Cylindrical container** (Figure 2), of stainless steel, with a volume of 100 cm<sup>3</sup> and a diameter-to-height ratio of approximately 1.

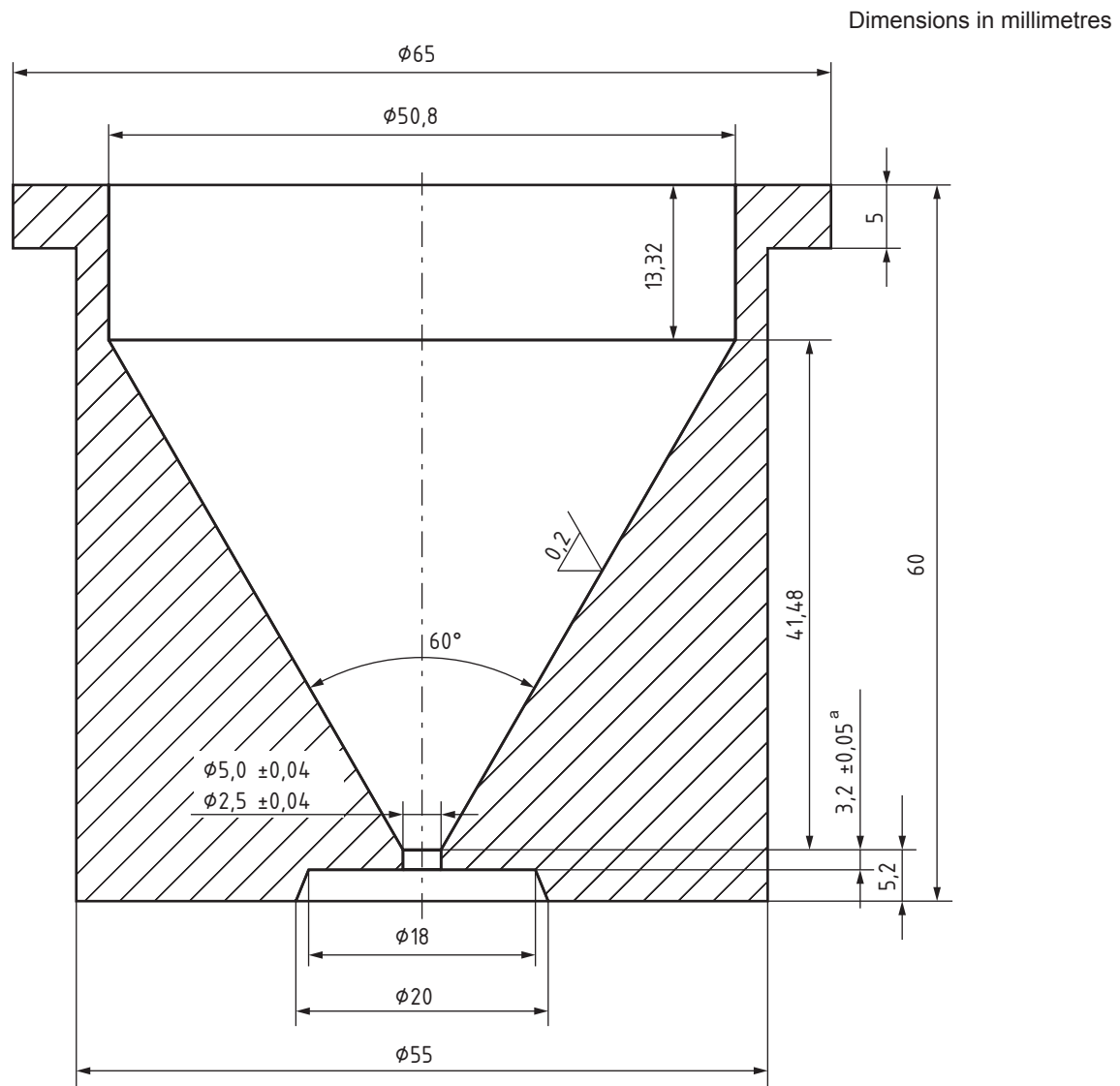
**4.3 Sieve**, as specified in ISO 565, with an aperture size of 0,71 mm.

**4.4 Balance**, with a precision of 0,1 g or 0,01 g.

A balance with a precision of 0,01 g should be used for very fluffy powders such as aerosil (fumed silica).

**4.5 Straight edge** (Figure 3), to remove the cone of surplus powder by gently drawing it.

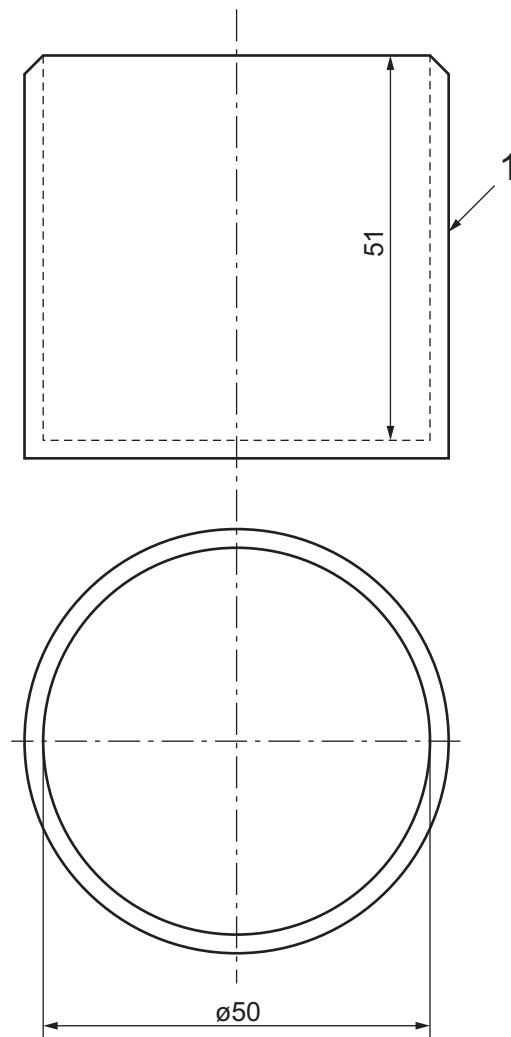
**4.6 Stand and horizontal vibration-free base.** A stand to support the funnel concentric with the cylindrical container so that the bottom of the funnel orifice is approximately 50 mm above the top of the cylindrical container when the apparatus is assembled as shown in Figure 4.



<sup>a</sup> Or  $6,4 \pm 0,05$  for 5,0 mm diameter.

**Figure 1 — Example of a funnel**

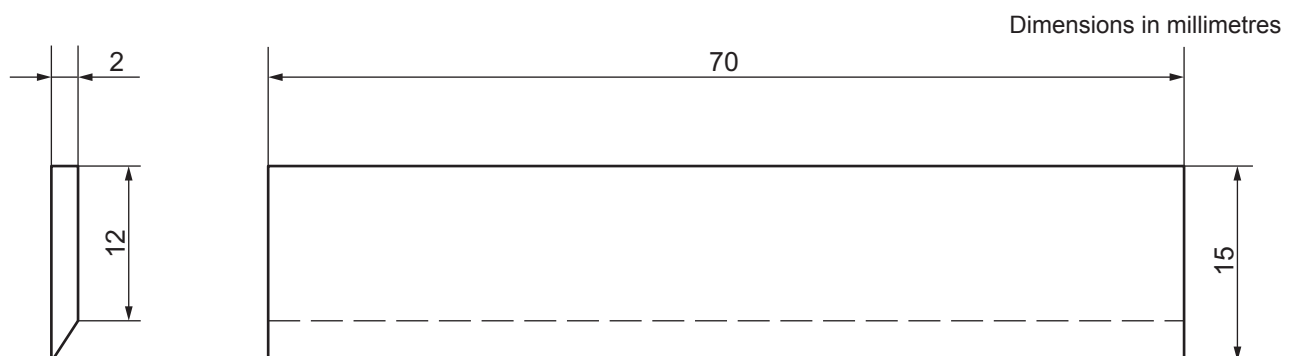
Dimensions in millimetres



**Key**

1 cylindrical container

**Figure 2 — Example of a cylindrical container**



**Figure 3 — Example of a straight edge**

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