INTERNATIONAL STANDARD

ISO 18591

First edition
2015-12-01

Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of compressive strength of ceramic granules

Céramiques fines (céramiques avancées, céramiques techniques avancées) — Détermination de la force de compression des granules de céramique

Reference number
ISO 18591:2015(E)

© ISO 2015



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ..... **iv**
1 Scope **1**
2 Normative references **1**
3 Principle **1**
4 Symbols and designation **1**
5 Apparatus **1**
6 Sampling **2**
7 Procedure **2**
7.1 Quantity 2
7.2 Cleaning of the die and the punches 2
7.3 Powder testing conditions 2
7.4 Lubrication 3
7.5 Compaction and ejection 3
8 Expression of results **4**
8.1 Load-displacement curve 4
8.2 Pressure-density curve 4
8.3 Compressive strength of ceramic granules 4
9 Test report **4**
Bibliography **8**

© ISO 2015 – All rights reserved

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 206, *Fine ceramics*.

© ISO 2015 – All rights reserved

Fine ceramics (advanced ceramics, advanced technical ceramics) — Determination of compressive strength of ceramic granules

1 Scope

This International Standard specifies the testing method to determine the compressive strength of ceramic granules, when subjected to uniaxial compressive loading in a confining die, under specified conditions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

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

3 Principle

In general, a ceramic powder compact is made of ceramic granules. When ceramic granules are compacted uniaxially in a confining die by pressing, first they are rearranged during compaction. However, when a pressure higher than the critical pressure is applied to ceramic granules, the deformation and the fracture of granulated powder also occur. The final density of powder compact depends on the compressive strength (critical pressure) of ceramic granules. When ceramic granules are pressed in a die by using a universal testing machine (UTM), a load-displacement (or load-strain) curve can be obtained. Load-displacement curve can be converted into pressure-density curve by using the dimensions and density of a powder compact ejected from the die. The compressive strength can be determined from the slope change in the pressure-density curve.

4 Symbols and designation

Symbol	Designation	Unit
ρ_p	Green density of powder compact	g/cm^3
m	Mass of powder compact	g
V	Volume of powder compact	cm^3
A	Area of powder compact	cm^2
h	Height of powder compact	cm
l	Displacement of powder compact	cm
l_f	Final displacement of powder compact	cm

5 Apparatus

5.1 Cylindrical die, which shall be made from a hard material, preferably hardened steel or tungsten carbide. The die for producing cylindrical compacts shall contain two punches and shall be of a floating type

© ISO 2015 – All rights reserved