

First edition
2008-09-15

Representation of results of particle size analysis —

Part 6: Descriptive and quantitative representation of particle shape and morphology

Représentation de données obtenues par analyse granulométrique

Partie 6: Description et représentation quantitative de la forme et de la morphologie des particules



Reference number
ISO 9276-6:2008(E)

© ISO 2008

This is a preview of "ISO 9276-6:2008". [Click here to purchase the full version from the ANSI store.](#)

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.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

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
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 9276-6:2008". Click [here](#) to purchase the full version from the ANSI store.

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Symbols and abbreviated terms	2
4 Criteria for the evaluation of shape description methods	3
5 Classification of methods and descriptors.....	4
5.1 General classification	4
5.2 Levels of shape.....	4
5.3 Principles for deriving shape descriptors	6
6 Errors which can occur in the analysis of a single image	7
6.1 Generation of shape descriptors	7
6.2 Image resolution	7
6.3 Binarization	8
6.4 Algorithms for calculating shape descriptors.....	8
7 Size parameters for normalization of shape descriptors	9
8 Shape descriptors	10
8.1 Macroshape descriptors	10
8.2 Mesoshape descriptors	12
8.3 Combination of shape descriptors	13
8.4 Roughness descriptor	14
Annex A (normative) Some computation equations	15
Annex B (informative) Examples of methods of presentation of shape and size distribution data.....	16
Bibliography	22

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 9276-6 was prepared by Technical Committee ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 4, *Sizing by methods other than sieving*.

ISO 9276 consists of the following parts, under the general title *Representation of results of particle size analysis*:

- *Part 1: Graphical representation*
- *Part 2: Calculation of average particle sizes/diameters and moments from particle size distributions*
- *Part 3: Adjustment of an experimental curve to a reference model*
- *Part 4: Characterization of a classification process*
- *Part 5: Methods of calculation relating to particle size analyses using logarithmic normal probability distribution*
- *Part 6: Descriptive and quantitative representation of particle shape and morphology*

This is a preview of "ISO 9276-6:2008". [Click here to purchase the full version from the ANSI store.](#)

Introduction

A variety of different methods for the descriptive and quantitative representation of particle shape and morphology are known. Even for the term particle size, there is no single definition. Different methods of size analysis are based on the measurement of different physical properties. In ISO 9276-1, the particle size is defined as the diameter of a sphere having the same physical property. This is known as the equivalent spherical diameter. So-called property functions help to correlate it with the property of primary interest, which may, for instance, be flowability, taste or dissolution time.

Broad application of sizing methods in particle characterization shows that particle size is often an important factor. But particle size alone is not sufficient to allow particle phenomena such as powder flow, mixing, abrasion or biological response to be understood. Particle shape and morphology play an important role in particle systems and therefore it is also necessary to characterize and describe these characteristics quantitatively.

Including additional shape parameters in property functions is supposed to give a better correlation with the particular property of the particle system. For instance, knowledge of the size of grinding particles and of the sharpness of their edges will make it possible not only to distinguish between fresh and used grinding particles but also to predict their abrasive effect quantitatively by means of a property function.

ISO 13322-1 and ISO 13322-2 give guidance on the measurement, description and validation methodologies used when determining particle sizes by static and dynamic image analysis, respectively. Broad industrial use of image analysis techniques requires standardized methods of measurement for the characterization of the size, geometrical shape and morphology of particles.

A particle's shape is the envelope formed by all the points on the surface of the particle. Particle morphology represents the extension of a simple shape description of this kind to more complex descriptions including characteristics such as porosity, roughness and texture.

Various glossaries of terms giving descriptions, in words, of particle shape and morphology already exist (see Clause 5). These descriptions may be useful for the classification or identification of particles but, at the moment, there is insufficient consensus on the definition of particle shape and morphology in the quantitative terms necessary for them to be implemented in software routines. A future revision of this part of ISO 9276 may cover this.