

Determination of particle size distribution — Single-particle light interaction methods —

Part 1: Light interaction considerations

ICS 19.120

National foreword

This British Standard reproduces verbatim ISO 13323-1:2000 and implements it as the UK national standard. Together with BS ISO 13323-2 and BS ISO 13323-3 (to be published), it supersedes BS 3406-7:1988 which will be withdrawn on publication of BS ISO 13323-2 and BS ISO 13323-3.

The UK participation in its preparation was entrusted by Technical Committee LBI/37, Sieves, screens and particle sizing, to Subcommittee LBI/37/4, Sizing by methods other than sieving, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Attention is drawn to the following errors in the text of the ISO standard.

1. The definition of Stokes number should be amended as follows:
 - delete “**3.1.5 Stoke’s number**” and substitute “**3.1.15 Stokes number**”;
 - delete “time for a particle to accommodate a fluid velocity change” and substitute “time required for a particle to adjust its velocity to a new condition of forces”;
 - after equation (2), insert the following Note: “Note. Strictly, this equation applies only under laminar flow conditions”.
2. The definition of extinction coefficient should be amended as follows:
 - delete “**3.1.6**” and substitute “**3.1.16**”.
3. With reference to equation (A.3), it may be noted that the Mie scattering equation is a rigorous solution for all sizes of particle. For very small particles the Mie solution and the Rayleigh approximation agree.
4. With reference to equation (B.1), the Lambert-Beer law should read as follows:

$$I = I_0 \exp(-Ac_n l)$$

Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Summary of pages

This document comprises a front cover, an inside front cover, the ISO title page, pages ii to v, a blank page, pages 1 to 15 and a back cover.

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Determination of particle size distribution — Single-particle light interaction methods —

Part 1: Light interaction considerations

*Détermination de la distribution granulométrique — Méthodes d'interaction
lumineuse de particules uniques —*

Partie 1: Considérations relatives à l'interaction lumineuse



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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 3.

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 part of ISO 13323 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13323-1 was prepared by Technical Committee ISO/TC 24, *Sieves, sieving and other sizing methods*, Subcommittee SC 4, *Sizing by methods other than sieving*.

ISO 13323 consists of the following parts, under the general title *Determination of particle size distribution — Single-particle light interaction methods*:

- *Part 1: Light interaction considerations*
- *Part 2: Light-scattering single-particle light interaction device design, performance specifications and operation requirements*
- *Part 3: Single-particle light-extinction device design, performance specifications and operation requirements*

Annexes A, B and C of this part of ISO 13323-1 are for information only.

Introduction

Measurement of individual particles by interaction with light has been carried out for many years using a variety of instruments. These instruments vary in optical design, light-source types, and means of particle presentation to the light. For these reasons, data from nearly identical particle sources frequently differ when different instruments are used for measurement. In addition, the extent of light interaction produced by a particle is affected by several physical parameters in addition to the particle size. The purpose of this part of ISO 13323 is to define the basis for, and to reduce the variability of, data produced by light interaction methods of particle size measurement.

Particle size measurement by single-particle light interaction devices normally involves either determination of the light scattered as a result of the light interaction with a single-particle or the amount of light extinction caused by the presence of the particle in the light beam. This part of ISO 13323 will discuss the principle of the light interaction phenomena that are measured. The general performance and operational parameters that are pertinent to the instruments and to the particle/fluid environment in which the instruments operate will be summarized. Specific instrument types, operation, and performance are not discussed in this part of ISO 13323.

