

Methods for

Determination of particle size distribution

**Part 9. Recommendations for the filter
blockage method (mesh obscuration)**

ICS 19.120

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The preparation of this British Standard was entrusted by Technical Committee LBI/37, Sieves, screens and particle sizing, to Subcommittee LBI/37/4, Sizing by methods other than sieving, upon which the following bodies were represented:

- BLWA Ltd. (the Association of the Laboratory Supply Industry)
- British Fluid Power Association
- China Clay Association
- Defence Research Agency
- Institution of Chemical Engineers
- Institution of Electrical Engineers
- Loughborough University
- NABIM
- Royal Pharmaceutical Society of Great Britain
- Royal Society of Chemistry
- Society of Chemical Industry
- University of Bradford

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on 15 August 1997

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Amendments issued since publication

Amd. No.	Date	Text affected

The following BSI references relate to the work on this standard:
Committee reference LBI/37/4
Draft for comment 96/120764 DC

ISBN 0 580 27610 4

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Recommendations	
1 Scope	1
2 Informative references	1
3 Definitions	1
4 Health and safety	1
5 Objective, principle and practical requirements	1
6 Operating procedures	2
7 Calibration and control of instruments for particles suspended in a liquid	5
Annexes	
A (informative) Examples of determination of particle count (see also annex E)	6
B (normative) Sampling procedures using bottles	6
C (informative) Guidance on the applicability of the technique	7
D (informative) Bibliography	7
E (informative) Calculation of filter blockage	8
Figures	
1 Characteristics of filter blockage processes	3
2 Schematic diagram of modes of operation	4
List of references	Inside back cover

Foreword

This Part of BS 3406 has been prepared by Subcommittee LBI/37/4, which entrusted its drafting to Panel LBI/37/4/3. It is one of a series of methods for determining the size distribution of particles. Other Parts of BS 3406 are:

Part 1	<i>Guide to powder sampling</i>
Part 2	<i>Recommendations for gravitational liquid sedimentation methods for powders and suspensions</i>
Part 3	<i>Air elutriation methods (obsolescent)</i>
Part 4	<i>Guide to microscope and image analysis methods</i>
Part 5	<i>Recommendations for electrical sensing zone method (the Coulter principle)</i>
Part 6	<i>Recommendations for centrifugal liquid sedimentation methods for powders and suspensions</i>
Part 7	<i>Recommendations for single particle light interaction methods</i>
Part 8	<i>Photon correlation spectroscopy</i>
Part 10	<i>Laser diffraction methods¹⁾</i>

Particle size distribution is an important basic property, which frequently forms part of a specification. Even when other bulk properties are specified, compliance with a specification may only be achievable by varying the particle size distribution. Particle size analysis is also used extensively to monitor environmental conditions and machine condition, and in numerous areas of scientific research. In all of these contexts the reproducibility and comparability of results is of paramount importance and the use of standardized procedure is essential.

The techniques used to measure particle size distribution are many, and are varied both in principle and in their degree of sophistication and automation. In principle, any property that depends on particle size can be used to define particle size distribution.

Most methods of particle size measurement ascribe a single dimension to each particle, usually expressed as the diameter of the spherical particle equivalent to some aspect of its properties, such as volume, cross-sectional area, surface, settling velocity or light scattering. Physical properties of the particles, such as solubility, friability, refractive index and conductivity, preclude the use of some methods. In addition, the properties of the fluid in which the particulate is suspended, such as colour and density, may significantly interfere with the measurement method. Measurements, however, can be made but will result in different distributions depending on which method is used. The inter-comparison of results can only be reliable if each test situation is using a representative sample and is measuring the same parameter using the same type of reliable equipment and procedures.

The choice of the most suitable technique will depend on the following considerations:

- (a) the purpose for which the analysis is required, e.g. quality control, research, specification requirements;
- (b) wherever possible, the dimension measured should relate to the purpose for which it is required, e.g. Stokes diameter for inertial separation;
- (c) the size range and other properties of the particles, e.g. density, solubility, refractive index, morphology;
- (d) aggregation and dispersion characteristics of the particulate matter;
- (e) the amount available for analysis;
- (f) the method by which the sample of particulate matter has been collected or whether on-line analysis is required;
- (g) the conditions under which the particulate matter is used, e.g. the state of dispersion in an off-line test, should be related to the state of dispersion in the application;
- (h) resources available.

¹⁾ In preparation.

The filter blockage technique is particularly suitable for many industrial situations where there may be widely varying levels of particulate matter in a suspension fluid. This is because of the inherent ruggedness of the method, which is unaffected by the restrictions which usually have to be placed on optical methods. It should be noted that the filter blockage method looks at the concentration and magnitude of particles with regard to their potential to block; hence it is able to detect particles even where there are variations in opacity or where mixed fluids are involved. The filter blockage method does not directly measure individual particles, but makes an assessment of the concentration of particles greater in size than the sensor used.

It has been assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people, for whose guidance it has been prepared.

WARNING. This British Standard calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. Attention is drawn to the specific hazards described in clause 4.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 8, an inside back cover and a back cover.