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Glossary of

Terms relating to particle technology

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Mechanical Engineering Standards Policy Committee (GME/-) to Technical Committee GME/29, upon which the following bodies were represented:

- British Cement Association
- British Coal Corporation
- British Laboratory Ware Association
- Coated Abrasives Manufacturers' Association
- Guild of Metal Perforators
- Institution of Chemical Engineers
- Institution of Mining and Metallurgy
- Mechanical Handling Engineers Association
- Ministry of Defence
- NABIM
- Society of Chemical Industry
- Society of Cosmetic Scientists
- Woven Wire Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- AEA Technology
- Aluminium Federation
- China Clay Association
- Defence Research Agency
- Department of Trade and Industry (National Physical Laboratory)
- GAMBICA (BEAMA Ltd.)
- Loughborough University of Technology
- Royal Pharmaceutical Society of Great Britain
- Royal Society of Chemistry
- University of Bradford

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Foreword

This British Standard has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee. It is a revision of BS 2955 : 1958 *Glossary of terms relating to powders*, which is withdrawn.

This British Standard defines terms used in the characterization of particles in powders, suspensions and emulsions.

The standard previously related only to powders, but as the new title implies, this revision now relates to particle technology and has been extended to encompass terms used in the measurement of suspensions and emulsions as well as in the estimation of specific surface area and porosity.

This glossary will be useful not only to particle technologists but also to those in related industries not intimately acquainted with particles, surfaces and pores. Terms and definitions are grouped into subject areas (categories). The items in the categories are classified so that, as far as possible, related concepts are grouped together. The terms in the classified lists are numbered and an alphabetical index is provided. Within each subject area the terms are arranged alphabetically, unless there is a strong association that dictates otherwise. This arrangement serves as more than a specialist's dictionary. The definitions of neighbouring concepts can be used to reinforce or contrast with each other, as well as being an aid to finding a suitable term for a particular concept without having to search through the entire glossary.

Every attempt has been made to use definitions for the same terms given in existing British Standards and to obtain agreement on the terms included and on their definitions. Some terms may have been omitted, and some added, to cover the general requirements of the modern particle technologist as more and more terms are entering into common usage. Suggestions for new terms and improvements to existing definitions are welcomed by the committee responsible for the updating of this standard.

Italicised words in definitions indicate terms that are defined elsewhere in this glossary.

Terms that are repeated because they have different meanings are distinguished by numbers: e.g. frame (1) 11 013 frame (2) 12 027.

Terms of more than one word, e.g. 'clean room' are written in the direct style. However the inverted term 'room, clean' is also included in the index with a reference to the direct term.

Generally terms are given in the singular, even when the plural form is more common.

Terms which are preferred are given first, followed by alternative terms; all separated by semicolons, e.g. floc; flocc; flocculate.

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No.	Term	Definition
1 General terms		
1 001	accuracy	The closeness of the agreement between the result of a measurement and the true value. NOTE. See also <i>precision</i> .
1 002	aerosol	A <i>dispersion</i> of <i>particles</i> (solid or liquid) suspended in a gas.
1 003	attrition	The reduction in size caused by the collision of <i>particles</i> with other <i>particles</i> or with surfaces.
1 004	cavitation	The formation of a cavity.
1 005	channel	A particle size range as set into automatic particle size analysers
1 006	classification	<i>Grading</i> in accordance with <i>particle</i> size, shape or density.
1 007	clean room	A room with control of <i>particulate</i> contamination.
1 008	coagulant	An agent causing <i>coagulation</i> .
1 009	coincidence	The detection of two or more particles as a single particle.
1 010	coincidence vector	A factor to correct a <i>coincidence</i> error in <i>particle</i> counting.
1 011	colloid	A substance consisting of <i>particles</i> not exceeding 1 μm dispersed in a <i>fluid</i> .
1 012	disintegrant	Material incorporated within <i>compacts</i> of dry <i>powders</i> or granules to promote separation to the primary <i>particles</i> , on addition to a liquid.
1 013	dispersant	A substance used to facilitate the <i>dispersion</i> of <i>particles</i> .
1 014	dispersivity quotient	The variation of refractive index with wavelength.
1 015	effective particle	Something perceived as a <i>particle</i> by a measuring technique applied to a <i>powder</i> .
1 016	emulsion	A <i>dispersion</i> of immiscible liquids.
1 017	filter porosity	The ratio (or percentage) of the accessible <i>void</i> volume to the total volume of the filter material.
1 018	flocc; floc; flocculate	An assemblage of <i>particles</i> which, having been initially dispersed, has become loosely coherent. NOTE. See also <i>flocculation</i> .
1 019	fluid	A liquid or gas.
1 020	fume	Cloud of airborne <i>particles</i> , generally visible, arising from condensation of vapours either from chemical or physical reactions.

No.	Term	Definition
1 021	HEPA filter	High efficiency particulate air filter, for <i>particles</i> in air, having a specified minimum collection efficiency according to, e.g. the <i>sodium chloride test</i> or the <i>DOP test</i> .
1 022	heterogeneous material	Material in which a spot sample will have a significantly different value of the characteristic under consideration from the mean value of the characteristic for the bulk material.
1 023	homogeneous material	Material in which a spot sample will have the same value of the characteristic under consideration as the mean value of that characteristic for the bulk material.
1 024	homogeneous suspension	A <i>suspension</i> , in which the <i>particles</i> are uniformly distributed.
1 025	homogenization	Mixing to create a uniformly dispersed <i>suspension</i> , e.g. by high shear mixing.
1 026	latex particles	<i>Particles</i> of natural latex or other polymer; usually spherical. Narrow size ranges are often used for <i>calibration</i> purposes.
1 027	log-normal distribution	A distribution of a variate, e.g. <i>particle</i> size, whose logarithm has a <i>normal distribution</i> . This results in a straight line when cumulative quantity on a probability axis is plotted against <i>particle</i> size on a logarithmic axis.
1 028	measuring range	The range over which an instrument as set-up can give results within a specified uncertainty. NOTE. Some instruments have many <i>measuring ranges</i> .
1 029	monolith	A block of material: a very large <i>particle</i> .
1 030	normal distribution; Gaussian distribution	A distribution which results in a straight line when cumulative quantity on a probability axis is plotted against <i>particle</i> size on a linear axis.
1 031	particle	A discrete piece of matter.
1 032	primary particle	The basic <i>particle</i> within an <i>agglomerate</i> or <i>flocculate</i> .
1 033	particulate	Consisting of <i>particles</i> .
1 034	phase	A physical state such as liquid, gas or solid.
1 035	powder	A dry material consisting of <i>particles</i> of size less than 1 mm in any direction.
1 036	precision	The spread between the individual measurements in the measurement process. NOTE. Precision can be expressed in terms of reproducibility and/or repeatability. See also <i>accuracy</i> .

No.	Term	Definition
1 037	Reynolds number	The dimensionless number which defines the flow pattern of a <i>fluid</i> surrounding a <i>particle</i>. NOTE. The Reynolds number is given by the following equation: $R = \frac{vd\rho}{\eta}$ where R is the Reynolds number; v is the relative velocity; d is the diameter of spherical particles; ρ is the density of fluid; η is the absolute viscosity. All values being in the same system of units.
1 038	Rosin-Rammler distribution	A mathematical function to describe <i>particle size distribution</i>, originally developed for broken coal.
1 039	Stokes-Einstein equation	The equation which relates the pace of <i>Brownian motion</i> to the diameter of the <i>particle</i> in motion. NOTE. The <i>Stokes-Einstein</i> equation is expressed as follows. $D = \frac{kT}{3\pi\eta d}$ where D is the diffusion coefficient of the <i>particle</i>; k is the Boltzmann constant; T is the temperature; η is the viscosity of the suspending <i>fluid</i>; d is the <i>particle</i> diameter (<i>diffusion diameter</i>). D is determined in <i>photon correlation spectroscopy</i> using the following equation: $D = \frac{1}{K^2 tc}$ where tc is the correlation time, as derived from the autocorrelation function; K is a constant derived from the optical detection geometry: $K = \frac{4\pi n}{\lambda} \sin \frac{\theta}{2},$ where n is the refractive index of the suspending fluid; θ is the scattering angle; λ is the wavelength of incident light. All values being in the same system of units.
1 040	Stokes' law	The equation which determines the <i>free-falling velocity</i> attained by a <i>particle</i> under <i>viscous flow</i> conditions and allows calculation of <i>particle</i> size. NOTE. <i>Stokes' law</i> is expressed by the following equation. $v = \frac{d^2 g (\sigma - \rho)}{18\eta}$ where v is the <i>free-falling velocity</i>; d is the <i>Stokes' diameter</i> of <i>particle</i>; g is the gravitational acceleration; σ is the density of <i>particle</i>; ρ is the density of <i>fluid</i>; η is the absolute viscosity. All values being in the same system of units.

No.	Term	Definition
1 041	surfactant	A substance which reduces surface tension.
1 042	suspension	A <i>dispersion</i> of <i>particles</i> in a <i>fluid</i> .
1 043	turbidity	The light scattering properties of <i>particles</i> suspended in a <i>fluid</i> .
2 Types of powder		
2 001	AC test dust; air cleaner test dust	A <i>powder</i> of specified size distribution, coarse or fine, for <i>calibration</i> , quality control or filter testing.
2 002	Arizona test dust	A <i>powder</i> of specified size distribution for <i>calibration</i> , quality control or filter testing.
2 003	atomized powder	A <i>powder</i> produced by the <i>dispersion</i> of molten material sprayed under conditions such that it solidifies as a finely divided <i>powder</i> .
2 004	ballotini	Glass spheres graded in size ranges.
2 005	calcined powder	A <i>powder</i> produced or modified by dry heat treatment.
2 006	calibration material	A <i>powder</i> or <i>suspension</i> used to calibrate instruments and methods.
2 007	carbonyl powder	A metal <i>powder</i> produced by the thermal decomposition of a metal carbonyl, generally nickel or iron or a combination of both.
2 008	certified reference material	A <i>reference material</i> accompanied by, or traceable to, a certificate stating the property value(s) concerned, issued by an organization that is generally accepted as technically competent.
2 009	crystalline powder	A <i>powder</i> produced by crystallization.
2 010	dust	Of occupational hygiene. <i>Particulate</i> material which is, or has been, airborne and which would pass through a 75 μm test sieve.
2 011	fumed powder	<i>Powder</i> recovered from a <i>fume</i> .
2 012	grit	Of occupational hygiene. <i>Particulate</i> material which is, or has been, airborne and which would be retained on a 75 μm test sieve.
2 013	hydrogen reduced powder	<i>Powder</i> produced by the hydrogen reduction of a metallic oxide or other compound.
2 014	milled powder	A <i>powder</i> produced by <i>comminution</i> in a mill.
2 015	natural powder	Material occurring naturally as fine <i>particles</i> .
2 016	precipitated powder	A <i>powder</i> produced by chemical precipitation.

No.	Term	Definition
2 017	reference material	A material, the relevant property of which is sufficiently established to be used for the <i>calibration</i> of a measuring instrument. NOTE. See also <i>certified reference material</i> .
2 018	test dust	A <i>powder</i> of known <i>particle size distribution</i> .
3 Powder properties		
3 001	absolute powder density	The mass of <i>powder</i> per unit of <i>absolute powder volume</i> .
3 002	absolute powder volume	The volume occupied by a <i>powder</i> excluding all pores and <i>voids</i> .
3 003	absolute volume	The volume of the solid matter after exclusion of all the spaces (pores and <i>voids</i>).
3 004	absorption	Penetration of a substance, usually a liquid, into the body of another.
3 005	aerated bulk density; poured density	The minimum <i>bulk density</i> of a motionless <i>powder</i> .
3 006	agglomerate	An assembly of <i>particles</i> rigidly joined together as by partial fusion, <i>sintering</i> or by growing together.
3 007	aggregate	An assembly of <i>particles</i> which are loosely attached to each other.
3 008	angle of repose	The angle to the horizontal assumed by the surface of a poured heap of <i>powder</i> at rest.
3 009	apparent powder density	The mass of a <i>powder</i> divided by its apparent volume.
3 010	apparent powder volume	The total volume of solid matter, <i>open pores</i> and <i>closed pores</i> and interstices.
3 011	blinding	The building up of small <i>particles</i> on a screening surface reducing the <i>aperture size</i> or closing them completely.
3 012	bridging	The formation of arches of <i>particles</i> keyed or jammed across the direction of flow.
3 013	bulk density; bulk powder density	The <i>apparent powder density</i> under defined conditions.
3 014	Carr's compressibility index	A measure of the <i>compressibility</i> of a <i>powder</i> determined by dividing the difference between the tapped and <i>aerated bulk densities</i> by the tapped bulk density as a proportion of 100.
3 015	compressibility	The ability of a <i>powder</i> to be compressed.