PD ISO/TS 22107:2021



BSI Standards Publication

Dispersibility of solid particles into a liquid

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National foreword

This Published Document is the UK implementation of ISO/TS 22107:2021.

The UK participation in its preparation was entrusted to Technical Committee LBI/37, Particle characterization including sieving.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2021

ISBN 978 0 539 06659 3

ICS 19.120

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 October 2021.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TS 22107:2021

TECHNICAL SPECIFICATION

ISO/TS 22107

First edition
2021-10-13

Dispersibility of solid particles into a liquid

Dispersibilité de particules solides dans un liquide

Reference number
ISO/TS 22107:2021(E)

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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.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 24, *Particle characterization including sieving*, Subcommittee SC 4, *Particle characterization*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Dispersing particles is crucial for many end-use product properties such as colour, sensorial quality, polishing, film homogeneity, conductivity, therapeutic efficacy, opacity of paints and inks, as well as UV protection in cosmetics. Dispersions are evaluated over the life-cycle of a product, beginning in the design stage, through production and for the end product. Additionally, some type of dispersion process is a prerequisite for many routine particle characterization methods. Finally, the state of dispersion is an important issue for risk evaluation of fine particles and for classification of nano-enabled products[37].

However, the ease with which a particulate material is dispersed in a liquid phase to meet established or desired criteria, commonly referred to as dispersibility, is not well defined; and its common usage varies widely across different fields and applications. Most existing definitions are application or product specific. Therefore, the need exists for a document that summarizes the common practice, and which also clearly defines dispersibility in a generic manner that is not application dependent. This document addresses that stated need.

The definition for dispersibility is established based on a survey of existing standards of national and international organisations as well as standardized procedures of industry in different application fields. With respect to the final product in different applications, the state of dispersion can be characterized according to the uniformity of the dispersed phase over the entire volume and according to the mean particle size or size distribution with respect to application specific criteria.

This document does not address intermediate- or long-term alterations including aging of a suspension following processing, nor does it address secondary destabilization phenomena. Stability and shelf life are considered in specific standards such as ISO/TR 13097 and ISO/TR 18811.

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Dispersibility of solid particles into a liquid

1 Scope

This document establishes a generally applicable (i.e. not application specific) definition for dispersibility. It identifies significant characteristics for evaluating dispersibility and lists examples of methods used to characterize dispersibility in various applications.

This document applies to processes that disperse powders into a liquid continuous phase while reducing the size of agglomerates or flocs down to the intended level, that homogenize an existing dispersed solid phase of a suspension or the mixture of two suspensions, or that exchange the original continuous phase in a suspension for another. Specific methods to disperse particles and to characterize the state of dispersion and/or homogeneity are only referenced, if necessary, for context.

This document is applicable to nano- and micro-sized particles across a range of product applications.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
agglomerate
loosely coherent assembly of *particles* (3.12) and/or *aggregates* (3.2) held together by weak physical interactions, with a total surface area virtually equal to the sum of the surface areas of the *constituent particles* (3.13)

Note 1 to entry: The transitive verb “agglomerate” means “to gather into a cluster”, and the process by which the cluster or assembly is formed is generally called “agglomeration”.

Note 2 to entry: Agglomeration can be a reversible process.

3.2
aggregate
assemblage of *particles* (3.12) into rigidly joined structures

Note 1 to entry: Formation of aggregates is usually an irreversible process.

Note 2 to entry: The forces holding an aggregate together are strong, for example covalent bonds or those resulting from sintering or complex physical entanglement.

Note 3 to entry: In common use, the terms aggregate and agglomerate (also aggregation and agglomeration) are sometimes applied interchangeably, but this practice is deprecated since the terms are not synonymous.

Note 4 to entry: The transitive verb “aggregate” means “to gather into a mass or whole”, and the process by which the structure is formed is generally called “aggregation”.

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