ICS 19.120
CCS A 28

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/Z 44306-2024

Particle - Guidelines for evaluation on quality consistency

颗粒 质量一致性评价指南

Issued on: August 23, 2024 **Implemented on: March 1, 2025**

Issued by: State Administration for Market Regulation;
Standardization Administration of China

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1.Structure and drafting rules for standardization documents" Drafting. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed and coordinated by the National Technical Committee for Particle Characterization and Sorting and Sieve Standardization (SAC/TC168). This document was drafted by: Institute of Process Engineering, Chinese Academy of Sciences, Henan Changxing Industrial Co., Ltd., Zhejiang University, China University of Metrology, Foshan Defang Nanotechnology Co., Ltd., Chongqing University, Beijing Taifengxianxing New Energy Technology Co., Ltd., Dandong Baite Instrument Co., Ltd., Jiyuan Zhongte Ceramic Materials Co., Ltd., Hefei Hongmeng Standard Technology Research Institute Co., Ltd., Shanghai University of Technology, Shanghai Second Polytechnic University, National Center for Nanoscience and Technology, Beijing Institute of Metrology and Measurement Science, Chongqing University of Science and Technology, Tianjin University, and Tsinghua

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Granular materials play an important role in all areas of the national economy. As raw materials, the consistency of granular quality will vary with design, The preparation and application of particles affect the quality of the product. As a product, the overall performance depends on the performance of the worst particles. The physical properties of the particles have a great influence on the performance of the raw materials or products. There are many parameters that describe the physical properties of particles. In practical applications, the combination of multiple physical property parameters can better reflect the physical properties of particles. The consistency of the individual physical property parameters of the particles can be tested and evaluated using appropriate technology and analytical instruments. The price is only one of the basic conditions for the delivery and acceptance of pellet products. The consistency of multiple parameter combinations between batches or within batches of pellet materials is becoming more and more important. It has become the focus of product quality evaluation. The demand and application in this area are becoming more and more extensive, such as traditional Chinese medicine preparations, electronic information particle materials, etc. materials, granular materials for new energy and other fields. Guidelines for the evaluation of particle quality consistency

1 Scope

This document gives guidance on evaluating the quality consistency of particulate materials: how to establish that what left the plant this month is the same as what left it last month, and how to express that sameness in numbers. Consistency, not specification, is what most powder disputes are actually about. A batch can sit inside every declared limit and still behave differently in the customer's process, because the limits are wide and the distribution inside them has moved. This document addresses that gap, and it applies across pharmaceuticals, battery materials, ceramics, pigments and abrasives alike. Issued on 23 August 2024 by SAMR and SAC as a guiding technical document, in force from 1 March 2025, under the technical jurisdiction of the Standardization Administration of China.

This document provides the principles of consistency evaluation of physical properties of granular materials, physical property parameter combinations, standardized conversions, calculations and evaluations, Evaluation report. This document is applicable to the consistency evaluation of multiple continuous numerical physical properties of granular materials between batches or within batches. This can be used as a reference for scenarios that require product consistency.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 16418 Terminology of particle systems

3 Terms and definitions

The terms and definitions defined in GB/T 16418 and the following apply to this document.

3.1 Quality consistency The degree to which a set of characteristics of samples are similar between batches or within batches.

Note. The degree of consistency of vector direction and value after the characteristic is vectorized.

3.2 A quantitative value that characterizes a physical property.

3.3 Euclidean distance In n-dimensional (real) Euclidean space, any two points x(x1,x2,,xn) and The distance between y(y1,y2,,yn) x1-y1()2 x2-y2()2 (xn-yn)2.

3.4 Cosine similarity Vector similarity is evaluated by calculating the cosine of the angle between two vectors. Note

1.The range of cosine value is between [-1,1]. The closer the value is to 1, the closer the directions of the two vectors are; the closer the value is to -1, the more opposite the directions are; the closer the value is to 1, the closer the directions are. When the value is 0, it means that the two vectors are nearly orthogonal. Note

2.Only non-negative values of cosine similarity are used in this document.

4 Principle

4.1 A combination of physical property parameters can be constructed based on the properties of granular materials (see Table 1). A single property can be composed of one or more specific