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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 21649.2-2017

**Particle size analysis -- Image analysis methods -- Part 2:
Dynamic image analysis methods
(English Translation)**

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Foreword

The following parts have been issued for GB/T 21649, Particle size analysis - Image analysis methods:

- Part 1: Static image analysis method;
- Part 2: Dynamic image analysis methods.

This Part is Part 2 of GB/T 21649.

This Part is drafted in accordance with the rules given in GB/T 1.1-2009.

This Part is identical to ISO 13322-2:2006 Particle size analysis - Image analysis methods - Part 2: Dynamic image analysis methods by the translation method.

The documents of our country that have a consistent correspondence with the international documents referenced in this Part are as follows:

-- GB/T 21649.1-2008, Particle size analysis - Image analysis methods - Part 1: Static image analysis method (ISO 13322-1:2004, MOD)

This Part makes the following editorial changes:

-- Correct "methods" in Clause 1 Scope of the international standard to "method", and "these methods" to "the method".

This Part is put forward by and shall be under the jurisdiction of National Technical Committee 168 on Screening and Particles Screen Analysis of Standardization Administration of China (SAC/TC 168).

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Particle size analysis - Image analysis methods - Part 2:

Dynamic image analysis methods

1 Scope

This Part of GB/T 21649 describe a method for controlling the position of moving particles in a liquid or gas and on a conveyor, as well as the image capture and image analysis of the particles. The method is used to measure the particle sizes and their distributions, the particles being appropriately dispersed in the liquid or gas medium or on the conveyor.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13322-1:2004 [Translator's note: should be ISO 13322-2:2004], Particle size analysis - Image analysis methods - Part 2: Dynamic image analysis methods

3.1 Terms and definitions

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

3.1.1

flow-cell

Measurement cell inside which the fluid-particle mixture flows.

3.1.2

orifice tube

Tube with an aperture through which a stream of fluid with dispersed particles flows.

3.1.3

sheath flow

(1), where t is either the strobe light emission time or camera shutter opening time (see Figure A.1), i.e.

Without appropriate grey level handling, a shall not exceed either 0.5 pixel or $x \cdot (\epsilon^2 - 1)$ pixel, where ϵ is the ratio of the measured particle diameter to the static particle diameter.

Grey level handling between pixel level and background level shall ensure that the measured diameter of binary image b equals the diameter, x , of the static particle.

The total system resolution should be determined based on the particle size distribution and the desired confidence limits (see ISO 13322-1:2004).

5.3 Calibration and traceability

The equipment shall be calibrated to convert pixels into SI length units (e.g., nanometres, micrometres, millimetres) for the final results. The calibration procedure shall include verification of the uniformity of the field of view. An essential requirement of the calibration procedure is that all measurements shall be traceable back to the standard metre. This can be achieved by calibration of the image analysis equipment with a certified standard stage micrometre.

Movement of particles during the capture of particle images, especially for smaller particles, may introduce serious error in determining particle sizes. It is therefore recommended that the whole system be verified with a standard reference material under motion.

The calibration particles shall be selected to include the dynamic range of the entire system. It is recommended to calibrate with three sizes of certified particles, i.e. with values near the maximum, mid-point and minimum particle sizes to be measured with the system.

5.4 Size classes and magnification

The theoretical limit for resolution of objects by size using image analysis is 1 pixel, and counts should be stored particle by particle, with the maximum resolution of 1 pixel. However, it is necessary to define size classes for the final reporting of the result, which is a function of the total number of particles, the dynamic range and the number of pixels included in the smallest considered objects. It is recommended that pixel size be converted to actual size prior to any reporting of size for quantitative analysis.

For a system in which not all the particles are measured, large particles may often be positioned on an edge of the image frame. Therefore, the magnification shall be selected