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

GB/T 6167.1-1985

Replacing GB/T 6167-2007

**Test methods for the performance of airborne particle counter
(English Translation)**

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Table of Contents

Preface
1 Scope
2 Normative References
3 Terms and Definitions
4 Requirements
5 Test Methods
Appendix A (Informative). Principles, Structure, and Typical Application Scenarios of Particle Counters
Appendix B (Normative) Storage of Standard Particles and Preparation of Diluents
Appendix C (Normative) Requirements for Particle Counter Performance Testing Apparatus
Appendix D (Informative) Comparative Experiment
References

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document replaces GB/T 6167-2007 "Test Methods for Performance of Dust Particle Counters". Compared with GB/T 6167-2007, except for the following.

Aside from structural adjustments and editorial changes, the main technical changes are as follows.

a) Added terms such as dust particle counter, pulse height analyzer, particle size distribution error, pseudo-count, counting response capability, and overlap error.

Difference and its definition (see 3.1, 3.4, 3.7, 3.9, 3.10 and 3.12);

b) The terminology for standard particles, test aerosols, particle size range, particle size resolution, counting efficiency, and upper limit of particle number concentration has been changed.

Its definition (see 3.2, 3.3, 3.5, 3.6, 3.8, 3.11; 3.2, 3.9, 3.3, 3.6, 3.5, 3.4 in the 2007 edition);

c) The terms "suspended particles," "particle size range accuracy," and "preheating time" and their definitions have been removed (see sections 3.1, 3.7, and 3.8 of the 2007 edition).

- d) Requirements and test methods for sampling time and particle size distribution error have been added (see 4.1, 4.3.3, 5.3, and 5.5.4);
- e) The requirements and test methods for spurious counts have been changed (see 4.5, 5.7, and 6.3.3 in the 2007 edition);
- f) The requirements and test methods for counting response capability have been changed (see 4.6, 5.8, and 6.3.4 in the 2007 edition);
- g) The requirements for test conditions have been changed (see 5.1, 6.1 in the 2007 edition);
- h) Increased requirements for test materials and instruments (see 5.2);
- i) Added segmented processing methods for particle size setting error and particle size resolution performance test methods (see 5.5.2, 5.5.3);
- j) A method for calculating the theoretical upper limit of particle number concentration has been added (see 5.9.1);
- k) The normative appendix "Comparative Method Tests" is changed to an informative appendix (see Appendix D, Appendix B of the 2007 edition).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Ministry of Housing and Urban-Rural Development of the People's Republic of China.

This document is under the jurisdiction of the National Technical Committee on Standardization of Heating, Ventilation, Air Conditioning and Purification Equipment (SAC/TC143).

1 Scope

This document specifies the requirements for dust particle counters and describes the corresponding test methods.

This document applies to the performance testing and verification of dust particle counters.

4.1 Sampling Time

The timing error of the particle counter during continuous sampling for 5 minutes should not exceed ± 1 second.

Note: This requirement does not apply to particle counters that do not have time control functionality.

4.2 Sampling flow rate

The relative error of the particle counter sampling flow rate should not exceed $\pm 5\%$.

Note: This requirement does not apply to particle counters that do not have a built-in sampling pump.

4.3.1 Particle size setting error

The particle size setting error of the particle counter should not exceed $\pm 10\%$.

4.3.2 Particle size resolution

The particle size resolution of the particle counter should not exceed 15%.

4.3.3 Particle size distribution error

When using 0.4 μm standard particles, the particle size distribution error of the particle counter should not exceed 15%; when using 0.6 μm standard particles...

At that time, the particle size distribution error of the particle counter should not exceed -30%.

4.4 Counting efficiency

When using standard particles at the corresponding minimum particle size setting, the counting efficiency of the particle counter should be $(50 \pm 20)\%$; when using the corresponding when using standard particles at 1.5 to 2 times the minimum particle size setting, the counting efficiency of the particle counter should be $(100 \pm 10)\%$.

4.5 Pseudo-counting

The particle counter continuously samples air samples that do not contain particles within the instrument's measurement range, considering the upper limit of the 95% confidence probability of the Poisson distribution.

The value should not exceed 1 grain/5 min.

4.6 Counting Response Capability

When switching from sampling high-particle-number-concentration gas to clean gas, the counting response capability of the particle counter should not exceed 0.5%.

4.7 Upper limit of particle number concentration

The upper limit of particle number concentration of a particle counter should not be lower than 90% of the nominal value.

5.1 Test Conditions

The performance test of the particle counter shall be carried out under the test conditions specified in Table 1.

5.2 Test Materials and Instruments

5.2.1

The test materials shall conform to the requirements of Table 2.

5.2.2

The testing instruments shall comply with the following provisions.

- a) Electronic stopwatch. 0.01s graduation value, maximum permissible error of ± 0.1 s per hour.
- b) Gas flow meter. The range covers the sampling flow rate of the test particle counter, with a maximum permissible error of $\pm 2\%$.
- c) Pulse height analyzer. sampling frequency not less than 10MHz, indicated voltage range covering 0V~10V, maximum permissible indicated voltage Error $\pm 0.2\%$, sampling channels no less than 256.

d) Reference particle counter. Compared with condensation nucleus particle counters or higher-performance instruments, the counting efficiency meets the requirements of 4.4;

When used for particle number concentration upper limit tests, the particle number concentration upper limit shall not be lower than the particle number concentration of the test particle counter.

1.5 times the limit.

e) Reference condensed nucleus particle counter. the counting efficiency is calibrated and does not exceed $(100 \pm 10)\%$.

5.3 Sampling Time

5.3.1

Power on and warm up. After the particle counter enters normal working condition, set the sampling time to 5 minutes.

5.3.2

Simultaneously start the electronic stopwatch and particle counter. When the particle counter reaches the set sampling time, stop timing and record the stopwatch's lowest value.

The time (t) is then displayed.