

ICS 13.100  
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**NATIONAL OCCUPATIONAL HEALTH STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GBZ/T 192.6-2018**

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**Determination of dust in the air of workplaces -- Part 6: Total  
number concentration of ultrafine and fine particles  
(English Translation)**

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### Foreword

This standard is formulated in accordance with the Law of the People's Republic GBZ/T 192 "Dust Determination in Workplace Air" is currently divided into 6 parts.

- Part 1. Total dust concentration;
- Part 2. Respirable dust concentration;
- Part 3. Dust dispersion;
- Part 4. Free silica content;
- Part 5. Asbestos fiber concentration;
- Part 6. Total concentration of ultrafine particles and fine particles.

This part is the sixth part of GBZ/T 192.

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

The main drafting units of this section. Zhejiang Provincial Center for Disease Control and Prevention, Beijing Institute of Labor Protection, China's disease prevention and control Center for Occupational Health and Poison Control, Zhejiang Academy of Medical Sciences, Guangdong Provincial Occupational Disease Prevention and Treatment Institute.

## 1 Scope

This part of GBZ/T 192 specifies the determination methods and technical requirements for the total concentration of ultrafine particles and fine particles in the workplace air.

This section applies to the determination of the total amount of ultrafine particles and fine particles in the workplace air.

## 2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document.

For undated references, the latest edition (including all amendments) applies to this document.

GBZ 159 Sampling specification for monitoring of hazardous substances in the workplace air  
GBZ/T 192.2 Determination of dust in workplace air - Part 2. Respiratory dust concentration  
JY/T 010 General Principles of Analytical Scanning Electron Microscopy  
ISO 27891 aerosol particle number counter calibration

## 3 Terms and definitions

And the following terms and definitions apply to this document.

Ultrafine particles

Nanoparticles

Particles having an equivalent particle size of less than 100 nm.

Fine particles

Particles having an equivalent particle size of less than 2500 nm and greater than 100 nm.

Reunion agglomerate

The weaker bonds between the ultrafine particles are similar to the sum of the external surface area of the agglomerated particles and the surface area of each particle.

Aggregate

The ultrafine particles are strongly bonded, and the outer surface of the aggregated particles is significantly smaller than the sum of the surfaces of each particle.

Nanomaterial at least one dimension in three dimensions in the nanoscale range (1 nm to 100 nm) or a material composed of them as basic units, nano the material has special physical and chemical properties compared to large-sized materials of the same chemical composition.

Condensate particle counter an apparatus for counting and measuring small particle size aerosol particles. The working principle is that the saturated steam is condensed on the ultrafine particles to make the particles the diameter grows to an optically detectable size.

Particle number concentration the number of ultrafine or fine particles per unit volume of air, usually expressed in cubic per cubic centimeter ( $P/cm^3$ ). Total quantity concentration refers to super the sum of the concentration of fine particles and fine particles.

Concentration ratio concentration ratio; CR the ratio of the total number of particles in contact with the worker or the concentration of the total amount of background particles can reflect the emission of the source of the particles.

The extent of fine particles.

Detection efficiency the ratio of the measured value of CPC to the true value as the CPC calibration factor.

## 4 Instruments

The measuring instrument is CPC, and the total amount of particles ( $P/cm^3$ ) is measured. Minimum configuration requirements. particle size detection range 20 nm ~ 3000nm, the concentration detection range is 1  $P/cm^3$  to 100000  $P/cm^3$ , and the aerosol inlet flow rate is 0.1 L/min to 5 L/min. Condensate is of analytical grade an alcohol such as isopropanol or n-butanol or purified water. CPC operating environment temperature 0 ° C ~ 40 ° C, the requirements for environmental humidity is not high.

### 5.1 Preparation of measuring instruments

#### 5.1.1

Measurement Instrument Selection. Evaluate individual exposures to prioritize individual CPCs and assess workplace exposures to select portable CPCs.

#### 5.1.2

Clean the CPC aerosol inlet filter before each use to prevent contamination by large particles or fibers.

#### 5.1.3

Before each use, the flow rate of the CPC aerosol inlet is corrected by a flow meter with an error of less than 5%.

#### 5.1.4

Before each use, use the built-in zero filter device in a clean environment outside the workplace to zero the CPC.

#### **5.1.5**

Replace the condensate wick before each use. The condensate wick should be replaced once every 4 hours of continuous measurement.

#### **5.1.6**

Set the measurement mode. Use the recording mode to set the continuous measurement time and the data recording interval (for example, 1 minute to automatically record one) the number of times), after the measurement is completed, the data can be directly printed or downloaded to the computer for further analysis. Data display mode (direct reading) available Concentration screening in field investigations helps identify sources of particulate matter and sources of hybrid particles.

### **5.2 Particle generation source identification**

The method of information collection, on-site investigation or concentration screening is used to identify the source of particle generation. See Appendix A for the specific method.

### **5.3 Particle attribute analysis**

The combined application field survey method and electron microscopy method are used to determine the name and attribute of the particles to be tested. See Appendix B for the specific method.

#### **5.4.1 Location of measurement**

##### **5.4.1.1**

Background Particles in the Workplace. The measurement location is selected to be away from the work area and personnel activities in the same workplace where the particulate emission source is located.

Fewer areas. The background concentration needs to be predicted to exclude the effects of sources of mixed particles in the area to be tested. If the effects of mixed particles cannot be ruled out, or if the work activity is uninterrupted for 24 hours, select the atmospheric background particles outside the workplace.

##### **5.4.1.2**

Outside the workplace Atmospheric background Particles. If the workplace is mechanically ventilated, the measurement location may be set if conditions permit 1m at the air inlet; if the work site adopts natural ventilation, the measurement location selects 1m outside the windward window of the workplace.