

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)

# Bestemmelse af partikelstørrelsesfordeling – Målemetoder for interaktion af lys med enkelte partikler – Del 4: Partikeltællere baseret på lysspredning fra luftbårne partikler i rene rum

Determination of particle size distribution – Single  
particle light interaction methods – Part 4: Light  
scattering airborne particle counter for clean spaces

**DANSK STANDARD**  
Danish Standards Association

Göteborg Plads 1  
DK-2150 Nordhavn

Tel: +45 39 96 61 01

Tel: +45 39 96 61 01

[dansk.standard@ds.dk](mailto:dansk.standard@ds.dk)

[www.ds.dk](http://www.ds.dk)

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)

DS projekt: M306681

ICS: 19.120

**Første del af denne publikations betegnelse er:**

**DS/ISO, hvilket betyder, at det er en international standard, der har status som dansk standard.**

**Denne publikations overensstemmelse er:**

**IDT med: ISO 21501-4:2018**

**DS-publikationen er på engelsk.**

**Denne publikation erstatter: [DS/ISO 21501-4:2007](#)**

---

### **DS-publikationstyper**

Dansk Standard udgiver forskellige publikationstyper.

Typen på denne publikation fremgår af forsiden.

Der kan være tale om:

#### **Dansk standard**

- standard, der er udarbejdet på nationalt niveau, eller som er baseret på et andet lands nationale standard, eller
- standard, der er udarbejdet på internationalt og/eller europæisk niveau, og som har fået status som dansk standard

#### **DS-information**

- publikation, der er udarbejdet på nationalt niveau, og som ikke har opnået status som standard, eller
- publikation, der er udarbejdet på internationalt og/eller europæisk niveau, og som ikke har fået status som standard, fx en teknisk rapport, eller
- europæisk præstandard

#### **DS-håndbog**

- samling af standarder, eventuelt suppleret med informativt materiale

#### **DS-hæfte**

- publikation med informativt materiale

Til disse publikationstyper kan endvidere udgives

- tillæg og rettelsesblade

### **DS-publikationsform**

Publikationstyperne udgives i forskellig form som henholdsvis

- fuldttekstpublikation (publikationen er trykt i sin helhed)
- godkendelsesblad (publikationen leveres i kopi med et trykt DS-omslag)
- elektronisk (publikationen leveres på et elektronisk medie)

### **DS-betegnelse**

Alle DS-publikationers betegnelse begynder med DS efterfulgt af et eller flere præfikser og et nr., fx **DS 383**, **DS/EN 5414** osv. Hvis der efter nr. er angivet et **A** eller **Cor**, betyder det, enten at det er et **tillæg** eller et **rettelsesblad** til hovedstandard, eller at det er indført i hovedstandard.

DS-betegnelse angives på forsiden.

### **Overensstemmelse med anden publikation:**

Overensstemmelse kan enten være IDT, EQV, NEQ eller MOD

- **IDT:** Når publikationen er identisk med en given publikation.
- **EQV:** Når publikationen teknisk er i overensstemmelse med en given publikation, men præsentationen er ændret.
- **NEQ:** Når publikationen teknisk eller præsentationsmæssigt ikke er i overensstemmelse med en given standard, men udarbejdet på baggrund af denne.
- **MOD:** Når publikationen er modificeret i forhold til en given publikation.

Second edition  
2018-05-15

---

---

## **Determination of particle size distribution — Single particle light interaction methods —**

### **Part 4: Light scattering airborne particle counter for clean spaces**

*Détermination de la distribution granulométrique — Méthodes  
d'interaction lumineuse de particules uniques —*

*Partie : Compteur de particules en suspension dans l'air en lumière  
dispersée pour espaces propres*



Reference number  
ISO 21501-4:2018(E)

© ISO 2018

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2018, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

This is a preview of "DS/ISO 21501-4:2018". Click here to purchase the full version from the ANSI store.

## Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Basic configuration</b> .....	<b>3</b>
<b>6 Requirements</b> .....	<b>3</b>
6.1 Size setting error.....	3
6.2 Counting efficiency.....	4
6.3 Size resolution.....	4
6.4 False count.....	4
6.5 Maximum particle number concentration.....	4
6.6 Sampling flow rate error.....	4
6.7 Sampling time error.....	4
6.8 Response rate.....	4
6.9 Calibration interval.....	4
6.10 Reporting of test and calibration results.....	5
<b>7 Test and calibration procedures</b> .....	<b>5</b>
7.1 Size setting.....	5
7.1.1 Evaluation of size setting error.....	5
7.1.2 Procedure of size setting.....	6
7.2 Evaluation of counting efficiency.....	9
7.3 Evaluation of size resolution.....	10
7.4 Evaluation of false count.....	11
7.5 Estimation of coincidence loss at the maximum particle number concentration.....	11
7.6 Evaluation of sampling flow rate error.....	12
7.7 Evaluation of sampling time error.....	12
7.8 Evaluation of response rate.....	12
<b>Annex A (informative) Counting efficiency</b> .....	<b>14</b>
<b>Annex B (informative) Size resolution</b> .....	<b>16</b>
<b>Annex C (informative) False count</b> .....	<b>17</b>
<b>Annex D (informative) Response rate</b> .....	<b>18</b>
<b>Annex E (informative) Procedure for evaluating the uncertainties of the results of the performance tests</b> .....	<b>19</b>
<b>Bibliography</b> .....	<b>25</b>

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://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*.

This second edition cancels and replaces the first edition ([ISO 21501-4:2007](#)), which has been technically revised.

The main changes from the previous edition are:

- [Clause 4](#) for “Principle” and [Clause 5](#) for “Basic configuration” have been added;
- “size calibration” and “verification of size setting” have been combined as “size setting error” in the requirements clause;
- “Test report” (3.11 in the previous edition) has been changed to [6.10](#) on “Reporting of test and calibration results”;
- information about uncertainties has been enriched and is now the subject of [Annex E](#).

A list of all parts in the [ISO 21501](#) series can be found on the ISO website.

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)

## **Introduction**

Monitoring particle contamination levels is required in various fields, e.g. in the electronic industry, in the pharmaceutical industry, in the manufacturing of precision machines and in medical operations. Particle counters are useful instruments for monitoring particle contamination in air. The purpose of this document is to provide a calibration procedure and verification method for particle counters, so as to minimize the inaccuracy in the measurement result by a counter, as well as the differences in the results measured by different instruments.

This is a preview of "DS/ISO 21501-4:2018". [Click here to purchase the full version from the ANSI store.](#)



This is a preview of "DS/ISO 21501-4:2018". Click [here](#) to purchase the full version from the ANSI store.

# Determination of particle size distribution — Single particle light interaction methods —

## Part 4: Light scattering airborne particle counter for clean spaces

### 1 Scope

This document describes a calibration and verification method for a light scattering airborne particle counter (LSAPC), which is used to measure the size distribution and particle number concentration of particles suspended in air. The light scattering method described in this document is based on single particle measurements. The typical size range of particles measured by this method is between 0,1  $\mu\text{m}$  and 10  $\mu\text{m}$  in particle size.

Instruments that conform to this document are used for the classification of air cleanliness in cleanrooms and associated controlled environments in accordance with [ISO 14644-1](#) and [ISO 14644-2](#), as well as the measurement of number and size distribution of particles in various environments.

The following parameters are within the scope of this document:

- size setting error;
- counting efficiency;
- size resolution;
- false count;
- maximum particle number concentration;
- sampling flow rate error;
- sampling time error;
- response rate;
- calibration interval;
- reporting results from test and calibration.

### 2 Normative references

There are no normative references in this document.