AS ISO 21501.1:2026
ISO 21501-1:2025

Australian STANDARD®

STANDARDS Australia

Determination of particle size distribution — Single particle light interaction methods

Part 1: Light scattering aerosol spectrometer



AS ISO 21501.1:2026

This Australian Standard® was prepared by NT-001, Nanotechnologies. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 11 June 2026.

This Standard was published on 26 June 2026.

The following are represented on Committee NT-001:

Adelaide University
Australian Industrial Chemicals Introduction Scheme
Australian Institute of Health & Safety
Australian Nuclear Science and Technology Organisation
Consumers' Federation of Australia
Engineers Australia
National Association of Testing Authorities Australia
National Measurement Institute
Smart Energy Council

This Standard was issued for comment as DR AS ISO 21501.1:2026

Status of this document

Standards Australia publications are periodically reviewed to ensure their ongoing relevance and accuracy. This document may be withdrawn, revised, or superseded at any time. To verify this document's current status, visit:

www.standards.org.au

ISBN: 978 1 76175 858 4

AS ISO 21501.1:2026
ISO 21501-1:2025

Australian Standard®

Determination of particle size distribution — Single particle light interaction methods

Part 1: Light scattering aerosol spectrometer

First published as AS ISO 21501.1:2026.

© ISO 2026 — All rights reserved
© Standards Australia Limited 2026

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth).

Users must not use the content in this publication in combination with artificial intelligence (AI) tools for any purpose, unless they have the express prior written consent from Standards Australia.

How to read this Standard

This page explains the meaning of the language and structure of this Standard.

Refer to Standards Australia's Standardisation Guide 006 for more details about drafting rules.

Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Standards Australia Committee NT-001, Nanotechnologies.

The objective of this document is to specify characteristics of a light scattering aerosol spectrometer (LSAS) which is used for measuring the size, number concentration and number-based size distribution of particles suspended in a gas. This document provides the calibration procedure and the validation method for aerosol spectrometers.

This document applies to —

(a) characterization of metered dose inhalers (MDI), dry powder inhalers (DPI) and nebulizers in pharmacy;

(b) production control of active agents;

(c) cut-off determination: impactors, cyclones and impingers;

(d) atmospheric aerosols: bio-aerosols, stables or composting facilities, nebulized droplets, measurements in street tunnels;

(e) fractional separation efficiency determination of filters.

This document is identical to and has been reproduced from ISO 21501-1:2025, *Determination of particle size distribution — Single particle light interaction methods — Part 1: Light scattering aerosol spectrometer*.

© Standards Australia Limited 2026

Contents

Page

Preface ..... **v**
Foreword ..... **vii**
Introduction ..... **viii**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Requirements **3**
4.1 Introduction 3
4.2 Counting efficiency 3
4.3 Size resolution 4
4.4 Sizing accuracy 4
4.5 Sampling flow rate 5
4.6 Effective flow rate through the sensing volume 5
4.7 Maximum particle number concentration 5
5 Test method **5**
5.1 Size calibration 5
5.2 Effective flow rate through the sensing volume 6
5.3 Maximum particle number concentration 7
5.4 Size resolution 8
5.5 Counting efficiency 9
5.5.1 Parallel comparison method 9
5.5.2 Generator method 10
5.6 Sampling flow rate 11
Annex A (informative) **Principle of the instruments** **12**
Annex B (informative) **Particle size standards** **19**
Annex C (informative) **Effects of LSAS parameters** **23**
Annex D (informative) **Representative sampling** **24**
Annex E (informative) **Example of an LSAS calibration with DEMC-classified PSL particles** **26**
Annex F (informative) **Counting efficiency** **28**
Bibliography **37**

© Standards Australia Limited 2026

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of 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 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 21501-1:2009), which has been technically revised.

The main changes are as follows:

— alignment with ISO 21501-4;

— addition of Annex F addressing counting efficiency.

A list of all parts in the ISO 21501 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© Standards Australia Limited 2026

Introduction

Particle size distributions and particle number concentrations must be monitored in various fields, e.g. in filter manufacturing, in the electronic industry, in the pharmaceutical industry, in the chemical industry, in the manufacture of precision machines and in medical operations. The aerosol spectrometer is a useful instrument for the determination of the size distribution and number concentration of particles suspended in a gas.

The purpose of this document is to provide the calibration procedure and the validation method for aerosol spectrometers, so as to improve the accuracy of the measurement result by aerosol spectrometers in general, and to minimize the difference in the results measured by different instruments.

The light scattering technique described in this document is based upon single particle measurements. The size range of particles measured by this method is between approximately 0,06 µm to 45 µm in diameter.

Instruments that conform to this document are used for the determination of the particle size distribution and particle number concentration at relatively high concentrations of up to 10^{11} particles/m^3.

© Standards Australia Limited 2026

Australian Standard®

Determination of particle size distribution — Single particle light interaction methods

Part 1: Light scattering aerosol spectrometer

1 Scope

This document specifies characteristics of a light scattering aerosol spectrometer (LSAS) which is used for measuring the size, number concentration and number-based size distribution of particles suspended in a gas. This document provide the calibration procedure and the validation method for aerosol spectrometers.

This document applies to:

— characterization of metered dose inhalers (MDI), dry powder inhalers (DPI) and nebulizers in pharmacy;

— production control of active agents;

— cut-off determination: impactors, cyclones and impingers;

— atmospheric aerosols: bio-aerosols, stables or composting facilities, nebulized droplets, measurements in street tunnels;

— fractional separation efficiency determination of filters.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
particle
discrete element of the material regardless of its size

[SOURCE: ISO 2395:1990, 3.1.1]

3.2
aerosol
airborne particles and the gas (and vapour) mixture in which they are suspended

Note 1 to entry: In general, one divides the atmospheric aerosol into three size categories: the ultrafine range $x < 0{,}1$ µm, the sub-micrometre range $0{,}1$ µm $< x < 1$ µm and the super-micrometre range $x > 1$ µm, where x is the particle diameter.

[SOURCE: ISO 4225:2020, 3.1.3.1, modified — Note 1 to entry added.]

© Standards Australia Limited 2026