

ISO 21083-1:2018 (E)

Test method to measure the efficiency of air filtration media against spherical nanomaterials — Part 1: Size range from 20 nm to 500 nm

Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms, definitions, symbols and abbreviated terms
3.1	Terms and definitions
3.2	Symbols and abbreviated terms
4	Principle
5	Test materials
5.1	General
5.2	Liquid phase aerosol
5.2.1	DEHS test aerosol
5.2.2	Liquid phase aerosol generation
5.2.2.1	Principles and specifications
5.2.2.2	Atomizer maintenance
6	Test setup
6.1	General
6.2	Specification of setup
6.2.1	Aerosol generation system
6.2.2	Tubing
6.2.3	Dryer
6.2.3.1	Principles
6.2.3.2	Maintenance
6.2.4	DEMC
6.2.4.1	Principles and specifications
6.2.4.2	Maintenance
6.2.5	Equilibrium charge distribution and neutralization of aerosol particles
6.2.6	Neutralization of aerosol particles
6.2.7	Make-up air line
6.2.8	Test filter medium mounting assembly
6.2.9	CPC
6.2.9.1	Principle and operation
6.2.9.2	Minimum specifications for CPC
6.2.9.3	Sources of error and limit errors
6.2.9.4	Maintenance and inspection
6.2.9.5	Calibration
6.2.10	Final filter
6.3	Detailed setup for test using DEHS particles
6.4	Determination of the filter medium velocity
7	Qualification of the test rig and apparatus
7.1	CPC tests
7.1.1	CPC — Air flow rate stability test
7.1.1.1	General
7.1.1.2	Air flow rate stability test protocol
7.1.1.3	Air flow rate stability test results

7.1.2	CPC — Zero test
7.1.2.1	General
7.1.2.2	Zero test protocol
7.1.2.3	Zero test results
7.1.3	CPC — Overload test
7.1.3.1	General
7.1.3.2	Overload test protocol
7.1.3.3	Overload test results
7.1.4	Counting accuracy calibration
7.2	DEMC tests
7.3	Qualification of aerosol neutralization
7.3.1	General
7.3.2	Qualification of neutralization by checking the multiple charge fraction on the particles passing through the neutralizer
7.3.3	Qualification of the aerosol neutralizer using corona discharge balanced output
7.3.4	Qualification of neutralization according to ISO/TS 19713-1
7.4	System leak checks
7.4.1	Air leakage tests
7.4.2	Visual detection by cold smoke
7.4.3	Pressurization of the test system
7.4.4	Use of high efficiency filter media
7.5	Uniformity of the test aerosol concentration
8	Test procedure
8.1	Determination of the correlation ratio/zero efficiency test
8.2	Protocol of filtration efficiency measurement
8.2.1	Preparatory checks
8.2.2	Equipment preparation
8.2.3	Aerosol generator
8.2.3.1	Aerosol generator — Response time
8.2.3.2	Aerosol response test protocol
8.2.3.3	Aerosol response time results
8.2.4	Aerosol generator — Neutralizer
8.2.4.1	General
8.2.4.2	Aerosol neutralizer test protocol
8.2.4.3	Aerosol neutralizer time results
8.2.4.4	Aerosol neutralizer — Radioactive service life verification
8.2.4.5	Radioactive aerosol neutralizer — Maintenance
8.2.4.6	Aerosol neutralizer — Corona discharge current
8.2.4.6.1	General
8.2.4.6.2	Aerosol neutralizer based on corona discharge — Maintenance
8.2.5	Filter medium neutralization
8.2.6	Filter medium neutralization according to ISO 29461-1
8.2.6.1	Equipment
8.2.6.2	Preparation of test samples
8.2.6.3	Measurement of filter medium efficiency
8.2.6.4	IPA vapour treatment test
8.2.6.5	IPA vapour treatment method
8.2.7	Air flow measurement
8.2.8	Measurement of the pressure drop
8.2.9	Zero count test
8.2.10	Air leakage test
8.2.11	Loading effect test
8.2.12	Reported values
8.2.13	Measurement of filtration efficiency — DEHS particles
8.3	Test evaluation
8.4	Measurement protocol for one sample — Summary
8.4.1	Using one CPC to measure the upstream and downstream particle concentrations
8.4.2	Using two CPCs to measure the upstream and downstream particle concentrations
9	Maintenance items
10	Measurement uncertainties

11 Reporting results

- 11.1 General**
- 11.2 Required reporting elements**
- 11.2.1 General**
- 11.2.2 Report summary**
- 11.2.3 Report Details**

Annex A (informative) Instruments specifications

Annex B (informative) Statistical analysis for precision of an experiment (according to ISO 5725-2)

- B.1 General**
- B.2 Nomenclature**
- B.3 Procedure**
- B.3.1 General**
- B.3.2 Scrutiny of test results for consistency and outliers**
- B.3.2.1 Graphical consistency technique**
- B.3.2.2 Numerical outlier technique**
- B.3.2.2.1 Cochran's test**
- B.3.2.2.2 Grubbs' test**
- B.3.3 Calculation of the general mean and variance**

Annex C (informative) Safe use of IPA

Annex D (informative) Safe handling of radioactive devices

Page count: 52