International Standard

ISO 16313-1

First edition
2025-12

Laboratory test of dust collection systems utilizing filter media with automatic online cleaning —

Part 1: System utilizing integrated fans

Essais en laboratoire des systèmes de collecte de poussières utilisant des médias filtrants avec nettoyage automatique en ligne —

Partie 1: Systèmes utilisant des ventilateurs intégrés

Reference number
ISO 16313-1:2025(en)

© ISO 2025



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025
All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Symbols and abbreviated terms ... **2**
5 Compact type dust collector ... **3**
6 Arrangement of test facility and test procedure ... **4**
6.1 General ... 4
6.2 Flow system ... 5
6.3 Test dust ... 7
6.3.1 General ... 7
6.3.2 Criteria for a test dust in this performance test ... 7
6.3.3 Storage of test dust ... 7
6.4 Dust feeder/dispersion system ... 7
6.4.1 Dust feeder ... 7
6.4.2 Dust dispersion ... 8
6.4.3 Dust concentration during performance measurement and determination of dust feed rate ... 8
6.4.4 Mixing of airborne dust with air ... 9
6.5 Measurement ... 9
6.5.1 Air flow rate ... 9
6.5.2 Air flow characteristics with and without attachments at inlet and outlet ducts ... 9
6.5.3 Pressure and pressure drop ... 9
6.5.4 Dust concentration ... 10
6.5.5 Energy consumption for fan and cleaning process ... 10
7 Test procedures ... **11**
7.1 General ... 11
7.2 Stage 1: Preparation ... 11
7.3 Stage 2: Break-in operation ... 11
7.4 Stage 3: Ageing operation ... 12
7.5 Stage 4: Stabilization ... 12
7.6 Stage 5: Performance measurement ... 12
8 Test report ... **13**
Annex A (informative) **Usage of dust collector** ... **15**
Annex B (informative) **Examples of test dust** ... **18**
Annex C (informative) **Example of measurement method of dust concentration in filtered gas** ... **21**
Annex D (informative) **Example of a test report** ... **23**
Annex E (informative) **Example of test results** ... **25**
Bibliography ... **31**

© ISO 2025 – All rights reserved

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 142, *Cleaning equipment for air and other gases*.

A list of all parts in the ISO 16313 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.

© ISO 2025 – All rights reserved

Introduction

An industrial dust collector is a system used to remove or recover particles from the gas emitted by industrial processes. Dust control filtration systems using pulse cleaning are one type of dust collectors and are widely used to remove particulate matters suspended in gases such as, combustion flue gases, local dust emissions from various dust generation activities (machining, tapping of molten pig iron, bulk handling, surface treatment work such as sand or shot blasting), to clean workshop environment, and so on[1-3].

This type of dust collection systems, or dust collectors, is most popularly used because of easiness in handling. However, the design concept of the collector is different strongly dependent on the size and type of dust generation source, amount of air flow rate, dust concentration and also on the usage as shown in Table A.1 and Figure A.1 in Annex A.

The performance of a dust collector changes with time. It changes significantly at the beginning of its use and becomes stable after certain period of usage.

Dust collectors are roughly classified into two groups; customized or general-purpose systems. Customized systems are designed and manufactured based on the user's requirements for temperature, pressure, physical and chemical properties of particles and gases, etc. Hence, performance test of this type for dust collector must be carried out to evaluate whether the collector satisfies these requirements.

The general-purpose system (compact type dust collector) is designed and assembled by the manufacturer based on the manufacturer's own concept. Most manufactures line up several different types of dust collectors to meet different applications such as industrial dust, fumes, and fume and mist mixture.

Most of these collectors are compact type dust collectors with cartridge filter elements.[4] The performance of collectors from different manufacturers is likely different with each other, even if they are tested under the same dust and operation condition. It is also likely that differences arise from the different test method adopted by each manufacturer.

This group of compact type dust collectors is mostly used by unspecified individual users, who do not have sufficiently enough knowledge of dust collection technology, so that they are used as a plug-in type device like a household electronics. Hence users select a dust collector based only on the information disclosed by the manufacturer. It is not always easy to compare performance of collectors from different manufacturers because of the different test methods[5,6] used for evaluating them.

This means that it would be better to provide a standard test method to predict the performance under simulated used conditions of the dust collector before the product is delivered to users. Important information for users includes dust collection performance of dust, pressure drop, energy consumption for fan and pulse cleaning equipment and air flow rate for without-air-flow-rate-control system. Emission of fine particles like PM_{10}, $PM_{2,5}$ and PM_1 is especially important for the protection of air pollution and working environmental control point of view.

Performance changes with time; with large changes at the beginning of usage, and more stable operation after certain time period. This means that the performance shown just after production is different from what the user experiences, i.e. performance after being used for long time. Therefore, performance test is conducted under simulated conditions of use.

© ISO 2025 – All rights reserved

Laboratory test of dust collection systems utilizing filter media with automatic online cleaning —

Part 1:
System utilizing integrated fans

1 Scope

This document specifies the standard test method to assess the performance of dust collectors utilizing integrated fans (compact type dust collector), at the time of manufacture, after being used for a certain period.

This document adopts the black box concept that the dust collector to be tested is operated with the specification determined by the manufacturer except test dust condition and the pulse interval during ageing.

This document is applicable to small dust collectors utilizing cartridge filters including molded filters or bag filters with pulse cleaning equipment as filtration media for dry dust collection. Mist and fumes collectors are excluded from this test.

The performance obtained from this test does not guarantee the performance of the system. This document is not intended to offer the superiority or inferiority of performance between dust collectors, but specifies a standard test method that provides users with performance under simulated conditions of use for a certain duration.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements*

ISO 5801, *Fans — Performance testing using standardized airways*

ISO 5011, *Inlet air cleaning equipment for internal combustion engines and compressors — Performance testing*

ISO 21904-2, *Health and safety in welding and allied processes — Equipment for capture and separation of welding fume Part 2: Requirements for testing and marking of separation efficiency*

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/

© ISO 2025 – All rights reserved

3.1
concentration
quantity of dust dispersed in a defined amount of air

Note 1 to entry: It is expressed as a unit of mass per actual unit volume of air.

3.2
pressure drop
difference in soluble (static) pressure between two points in an air flow system at specified conditions, especially when measured across the filter or GPACD

3.3
pulse cleaning system
components used to momentarily and locally reverse the airflow through a filtration system with the objective of removing collected particulate from the system's filtration elements

Note 1 to entry: These systems include all parts from the compressed air connection to the point of compressed air discharge into the filter element, and any associated equipment.

3.4
pulse interval
amount of time between the initiation of two successive pulses when the pulsing algorithm has not been satisfied

Note 1 to entry: It is typically measured in seconds (s).

3.5
Stairmand disk
plate occupying the central half of the area of a duct, oriented so it is perpendicular to the direction of air flow

Note 1 to entry: It is used to induce turbulence and mixing.

4 Symbols and abbreviated terms

A	Total filtration area [m^2]
C	Dust concentration [kg/m^3]
D	Duct diameter [m]
d_{pa}	Mean particle size (mass basis) [m]
F	Feed rate of test dust [kg/s]
m_d	Dust load per unit filtration surface [kg/m^2]
m_r	Residual dust load [kg/m^2]
n	Number of cleaning blocks [-]
P_I	Pressure in pulse cleaning system before pulse cleaning [Pa]
P_F	Pressure in pulse cleaning system after pulse cleaning [Pa]
Δp	Pressure drop [Pa]
Δp_0	Pressure drop of fresh cartridge filter [Pa]
Δp_r	Residual pressure drop [Pa]

© ISO 2025 – All rights reserved