

---

**Preskusne metode za ocenjevanje lastnosti sredstev in naprav za čiščenje zraka v plinski fazi za splošno prezračevanje - 1. del: Sredstva za čiščenje zraka v plinski fazi (ISO 10121-1:2014)**

Test method for assessing the performance of gas-phase air cleaning media and devices for general ventilation - Part 1: Gas-phase air cleaning media (ISO 10121-1:2014)

Methode zur Leistungsermittlung von Medien und Vorrichtungen zur Reinigung der Gasphase für die allgemeine Lüftung - Teil 1: Medien zur Reinigung der Gasphase (ISO 10121-1:2014)

Méthodes d'essai pour l'évaluation de la performance des médias et des dispositifs de filtration moléculaire pour la ventilation générale - Partie 1: Médias de filtration moléculaire (GPACM) (ISO 10121-1:2014)

**Ta slovenski standard je istoveten z: EN ISO 10121-1:2014**

**ICS:**

13.040.99	Drugi standardi v zvezi s kakovostjo zraka	Other standards related to air quality
91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning

**SIST EN ISO 10121-1:2014****en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 10121-1:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 10121-1**

April 2014

ICS 91.140.30

English Version

**Test method for assessing the performance of gas-phase air  
cleaning media and devices for general ventilation - Part 1: Gas-  
phase air cleaning media (ISO 10121-1:2014)**

Méthodes d'essai pour l'évaluation de la performance des  
médiats et des dispositifs de filtration moléculaire pour la  
ventilation générale - Partie 1: Médiats de filtration  
moléculaire (GPACM) (ISO 10121-1:2014)

Methode zur Leistungsermittlung von Medien und  
Vorrichtungen zur Reinigung der Gasphase für die  
allgemeine Lüftung - Teil 1: Medien zur Reinigung der  
Gasphase (ISO 10121-1:2014)

This European Standard was approved by CEN on 6 March 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**Contents**

Page

Foreword.....3

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

[SIST EN ISO 10121-1:2014](https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014)  
<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

## Foreword

This document (EN ISO 10121-1:2014) has been prepared by Technical Committee ISO/TC 142 “Cleaning equipment for air and other gases” in collaboration with Technical Committee CEN/TC 195 “Air filters for general air cleaning” the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 10121-1:2014 has been approved by CEN as EN ISO 10121-1:2014 without any modification.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 10121-1:2014](https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 10121-1:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

INTERNATIONAL  
STANDARD

ISO  
10121-1

First edition  
2014-04-15

---

---

**Test method for assessing the  
performance of gas-phase air cleaning  
media and devices for general  
ventilation —**

**Part 1:  
Gas-phase air cleaning media**

*Méthodes d'essai pour l'évaluation de la performance des médias  
et des dispositifs de filtration moléculaire pour la ventilation  
générale —*

*SIST EN ISO 10121-1:2014*

*Partie 1: Médias de filtration moléculaire (GPACM)*

<https://standards.iteh.ai/catalog/standards/sist/10a14c-4899-41e0-a194-6746761b5866/sist-en-iso-10121-1-2014>



Reference number  
ISO 10121-1:2014(E)

© ISO 2014

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 10121-1:2014](https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>



### **COPYRIGHT PROTECTED DOCUMENT**

© ISO 2014

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  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland



# 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 Symbols and abbreviated terms</b> .....	<b>6</b>
4.1 Symbols.....	6
4.2 Abbreviated terms.....	8
<b>5 Testing of different GPACM configurations</b> .....	<b>8</b>
5.1 General.....	8
5.2 Test setup and normative GPACM sample holder.....	9
5.3 Raw data, sampling accuracy and normative generation parameters.....	11
5.4 Test parameters for the standardized benchmark test.....	11
5.5 Test parameters selected between user and supplier.....	13
<b>6 Test sequence</b> .....	<b>14</b>
6.1 General.....	14
6.2 Conditioning and pressure drop determination.....	14
6.3 Capacity determination.....	15
6.4 Retentivity determination.....	18
<b>7 Validation of test setup</b> .....	<b>19</b>
7.1 General.....	19
7.2 Determination of rise time and decay time.....	19
<b>8 Evaluation and report</b> .....	<b>21</b>
8.1 Test report introduction.....	21
8.2 Test report example.....	21
<b>9 Safety features</b> .....	<b>25</b>
<b>Annex A (normative) Test equipment requirements, equipment validation and routine operation</b> .....	<b>26</b>
<b>Annex B (informative) Challenge gases, generation sources and analysis techniques</b> .....	<b>29</b>
<b>Annex C (informative) Design of a media test stand</b> .....	<b>35</b>
<b>Annex D (normative) Normative sampling procedures and test parameters for different GPACM</b> .....	<b>36</b>
<b>Bibliography</b> .....	<b>40</b>

## ISO 10121-1:2014(E)

## 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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 142, *Cleaning equipment for air and other gases*.

ISO 10121 consists of the following parts, under the general title *Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation*:

- Part 1: *Gas-phase air cleaning media (GPACM)*
- Part 2: *Gas-phase air cleaning devices (GPACD)*

## Introduction

There is an increasing use and need for gas-phase filtration in general filtration applications. This demand can be expected to increase rapidly due to the increasing pollution problems in the world together with an increasing awareness that solutions to the problems are available in the form of filtration devices or phrased more technically: gas-phase air cleaning devices (GPACD). The performance of devices using adsorption for gas removal relies to a large extent on the performance of a solid gas-phase air cleaning media (GPACM) incorporated in the device. Still applications, device performance and media performance are often poorly understood by the user and supplier of such media and devices. Media tests may also be adequate to offer data for real applications if actual low concentrations (<100 ppb) and longer exposure times (>weeks) can be used in the test, provided that the geometrical configuration, packing density and flow conditions of the small-scale test specimen are equal to those used in the real applications. Such tests are however not included in the scope of this part of ISO 10121. This part of ISO 10121 attempts to increase understanding and communication by supplying a more standardized interface between media suppliers, device suppliers and end users. At present, standards exist for general ventilation in Japan<sup>[1]</sup> by JIS, Automotive filters by ISO, in-duct sorptive media gas-phase air-cleaning devices by ASHRAE<sup>[2]</sup> and for adsorptive media by ASHRAE<sup>[3]</sup> and ASTM.<sup>[5]</sup> No international standard for general filtration exists today.

This part of ISO 10121 provides methods, test equipment, data interpretation and reporting for three different types of gas-phase air cleaning media (GPACM) intended for use in gas-phase air cleaning devices (GPACD) for general ventilation applications.

In addition information is given in a number of annexes:

- [Annex A](#) describes the normative validation procedure in detail in a tabulated form.
- [Annex B](#) gives a list of possible test gases, generation sources and suggests proper analysis equipment for common test gases
- [Annex C](#) describes the design of the test stand except the normative sample holder.
- [Annex D](#) describes the normative test setup and normative section of the test stand for the three different media configurations.

A general introduction to molecular filtration and molecular filtration testing can be found in the scientific literature.

The ISO 10121 series aims to provide laboratory test methods for media and devices which are used for removal of gas-phase contaminants from air in general ventilation. It consists of two parts:

- ISO 10121-1 covers three different media configurations and is targeted towards giving a standardized interface between media suppliers and producers of air cleaning devices. It may also be used between media suppliers and end customers with regards to loose fill media properties.
- ISO 10121-2 aims to give a standardized interface between suppliers of air cleaning devices and end customers seeking the best performing and most economical way to employ gas-phase filtration.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 10121-1:2014](#)

<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

# Test method for assessing the performance of gas-phase air cleaning media and devices for general ventilation —

## Part 1: Gas-phase air cleaning media

### 1 Scope

This part of ISO 10121 aims to provide an objective laboratory test method, a suggested apparatus, normative test sections and normative tests for evaluation of three different solid gas-phase air cleaning media (GPACM) or GPACM configurations for use in gas-phase air cleaning devices intended for general filtration applications. This part of ISO 10121 is specifically intended for challenge testing and not for general material evaluation or pore system characterization. The three different types of GPACM identified in this part of ISO 10121 are GPACM-LF (particles of different shape and size intended for e.g. Loose Fill applications), GPACM-FL (Flat sheet fabric intended for e.g. flat one layer, pleated or bag type devices) and GPACM-TS (three dimensional structures that are many times thicker than flat sheet and e.g. used as finished elements in a device). The tests are conducted in an air stream and the GPACM configurations are challenged with test gases under steady-state conditions. Since elevated gas challenge concentrations (relative to general ventilation applications) are used, test data should be used to compare GPACM within the same configuration and not for the purpose of predicting performance in a real situation. It is also not implied that different GPACM configurations can be directly compared. The primary intention is to be able to compare like GPACM configurations to like, not between GPACM configurations. Testing of complete devices is described in ISO 10121-2.

To ensure objectivity for test equipment suppliers, no specific design of the test apparatus is defined; an example is illustrated in [Annex C](#) (informative). Instead normative demands for media sample holder design, apparatus properties and validation tests are specified.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10121-2, *Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation — Part 2: Gas-phase air cleaning devices (GPACD)*

ISO 29464, *Cleaning equipment for air and other gases — Terminology*

ASTM D2854, *Standard Test Method for Apparent Density of Activated Carbon*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 29464 and the following apply.

#### 3.1

##### **absorption**

transport and dissolution of a sorbate into an absorbent

**ISO 10121-1:2014(E)****3.2****adsorbate**

molecular compound in gaseous or vapour phase that will be retained by the adsorbent material of the media

**3.3****adsorbent**

material that collects adsorbates on its surface through physical or chemical processes

**3.4****adsorption**

process in which the molecules of a gas adhere by physical or chemical processes to the exposed surface of solid substances, both the outer surface and inner pore surface, with which they come into contact

**3.5****breakthrough**

amount of gaseous contaminant in the effluent of a GPAC Media or Device

Note 1 to entry: See *penetration* (3.33).

**3.6****breakthrough vs. time curve**

plot of contaminant penetration versus time for a particular challenge concentration and airflow

[SOURCE: ISO 29464:2011; 3.2.67]

**3.7****bypass**

proportion of the challenge air stream that passes around the GPACD without contacting the filter media

[SOURCE: ISO 29464:2011; 3.2.64]

**3.8****capacity**

$m_s$   
amount (mass or moles) of a selected sorbate that can be contained in the GPAC Media or Device at given test conditions, and a specific end point

Note 1 to entry: Capacity can also be negative during desorption.

**3.9****challenge concentration**

concentration of the test contaminant(s) of interest in the air stream prior to filtration (challenge air stream)

**3.10****challenge compound**

chemical compound that is being used as the contaminant of interest for any given test

**3.11****challenge air stream**

test contaminant(s) of interest diluted to the specified concentration(s) of the test prior to filtration

[SOURCE: ISO 29464:2011; 3.2.16]

**3.12****channeling**

disproportionate or uneven flow of gas through passages of lower resistance due to inconsistencies in the design or production of a GPACD, particularly in packed granular beds

[SOURCE: ISO 29464:2011; 3.2.17]

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

SIST EN ISO 10121-1:2014  
<https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014>

**3.13****chemisorption  
chemical adsorption**

trapping of gaseous or vapour contaminants on an adsorbent involving chemical reaction on the adsorbent surface

[SOURCE: ISO 29464:2011; 3.2.19]

**3.14****concentration**
 $C_n$ 

quantity of one substance dispersed in a defined amount of another

Note 1 to entry: Indices “n” denote location or origin.

[SOURCE: ISO 29464:2011; 3.2.21]

**3.15****contaminant**

substance (solid, liquid, or gas) that negatively affects the intended use of a fluid

[SOURCE: ISO 29464:2011; 3.2.23]

**3.16****decay time**
 $t_{Dn}$ 

time required for the gas contaminant monitoring instrument to record a reduction from greater than 95 % of the challenge concentration to less than 5 % of the challenge concentration ( $t_{END} - t_{VC}$ ) at the downstream sampling point for a specific test (n), challenge gas and gas flow after stopping the injection of the contaminant with no GPAC Media or Device present

[SIST EN ISO 10121-1:2014](https://standards.iteh.ai/catalog/standards/sist/516aa14c-4899-4f1c-a794-6746761b5866/sist-en-iso-10121-1-2014)

**3.17****desorption**

process in which adsorbate molecules leave the surface of the adsorbent and re-enter the air stream

Note 1 to entry: Desorption is the opposite of adsorption.

**3.18****downstream**

area following the filter in the direction of fluid flow

**3.19****efficiency vs. time curve**

plot of the GPAC Media or Device removal efficiency against time over the duration of a challenge test for a particular challenge concentration and airflow

[SOURCE: ISO 29464:2011; 3.2.31]

**3.20****efficiency vs. capacity curve**

plot of the GPACD removal efficiency against the integrated capacity over the duration of a challenge test for a particular challenge concentration and airflow

[SOURCE: ISO 29464:2011; 3.2.28]

**3.21****face velocity**

air flow rate divided by the cross sectional area of the GPAC Media or Device