
**Road vehicles — Air filters for passenger
compartments —**

**Part 2:
Test for gaseous filtration**

*Véhicules routiers — Filtres à air pour l'habitacle —
Partie 2: Essai pour le filtrage des gaz*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing 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
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	1
4 Measurement accuracy	4
4.1 Flow rate	4
4.2 Pressure.....	4
4.3 Temperature	4
4.4 Relative humidity	4
4.5 Challenge gas.....	4
5 General conditions	4
5.1 Conditioning of challenge gas	4
5.2 Cleanliness of influent air	4
5.3 Challenge gas concentration stability	4
6 Test contaminants	5
6.1 Mandatory contaminants	5
6.2 Optional contaminants	5
6.3 Other contaminants	5
7 Test equipment	6
7.1 General layout	6
7.2 Test stand performance	6
7.3 Air supply	6
7.4 Test duct.....	6
7.5 Contaminant generation and supply	6
7.6 Sampling and analysis of challenge gas.....	7
7.7 Test equipment constituents	7
8 Experimental determination of t_0 , using t_{lag}	8
9 Preparation of filter/filter element for testing	8
10 Test methods.....	8
10.1 Purpose.....	8
10.2 Air pressure loss.....	8
10.3 Preparation of challenge gases.....	9
10.4 Determination of efficiency/breakthrough	9
10.5 Determination of capacity.....	9
10.6 Data and analysis.....	9
10.7 Determination of desorption (optional)	10
11 System validation	10
11.1 Air flow uniformity	10
11.2 Verification challenge gas stability (without test filter)	10
12 Test report	11
Annex A (normative) Test stand configuration	12
Annex B (normative) Detailed definition and calculation of t_0 and t_{lag}	13
Annex C (normative) Capacity determination	15
Annex D (informative) Conversion of test contaminant concentration units	16
Bibliography	17

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 11155-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 7, *Injection equipment and filters for use on road vehicles*.

This first edition of ISO 11155-2 cancels and replaces the ISO/TS 11155-2:2002, which has been technically revised.

ISO 11155 consists of the following parts, under the general title *Road vehicles — Air filters for passenger compartments*:

- *Part 1: Test for particulate filtration* [Technical Specification]
- *Part 2: Test for gaseous filtration*

Road vehicles — Air filters for passenger compartments —

Part 2: Test for gaseous filtration

1 Scope

This part of ISO 11155 specifies a test comprising several methods for measuring the dynamic gas adsorption of air filters in the passenger compartments of road vehicles. These laboratory test methods are applicable to air filters that improve air quality by reducing concentrations of gaseous, odorous or hazardous components from ambient or re-circulated air, or both, in the vehicle cabin. They provide a means of measuring air pressure loss, as well as gas and vapour removal characteristics.

2 Normative references

The following referenced documents are indispensable for the application 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/TS 11155-1, *Road vehicles — Air filters for passenger compartments — Part 1: Test for particulate filtration*

ISO 11841-1, *Road vehicles and internal combustion engines — Filter vocabulary — Part 1: Definitions of filters and filter components*

ISO 11841-2, *Road vehicles and internal combustion engines — Filter vocabulary — Part 2: Definitions of characteristics of filters and their components*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11841-1 and ISO 11841-2 and the following apply.

3.1

test flow rate

volume of air passing through the test duct per unit time

NOTE It is expressed in actual cubic metres per hour.

3.2

pressure loss

difference in static pressure measured upstream and downstream of the filter at a specified flow rate

NOTE It is expressed in pascals.

3.3

contaminant

unwanted constituent dispersed in air

3.4

concentration

quantity of one constituent dispersed in another

NOTE Contaminant concentrations are generally expressed as mass concentrations, i.e. mass of contaminant in milligrams per cubic metre of air. However, when the contaminant is measured as a volume fraction, i.e. volume of contaminant per volume of air (often in parts per million), it is necessary to convert the volume of contaminant into a mass. Conversion factors are given in Annex D.

3.5

influent air

cleaned air used to dilute contaminants and produce the challenge gas

3.6

challenge gas

homogeneous mixture of influent air and contaminant used to challenge the filter

3.7

challenge gas concentration

ratio of the mass (or volume) of test contaminant per volume of influent air measured under specified conditions

NOTE Contaminant concentrations are generally expressed as mass concentrations, i.e. mass of contaminant in milligrams per cubic metre of air. However, when the contaminant is measured as a volume fraction, i.e. volume of contaminant per volume of air (often in parts per million), it is necessary to convert the volume of contaminant into a mass. Conversion factors are given in Annex D.

3.8

test contaminant mass

m_T

total mass of test contaminant to which the filter is exposed

NOTE It is expressed in milligrams.

3.9

influent concentration

C_1

homogeneous challenge gas concentration measured before (upstream of) the filter

NOTE Contaminant concentrations are generally expressed as mass concentrations, i.e. mass of contaminant in milligrams per cubic metre of air. However, when the contaminant is measured as a volume fraction, i.e. volume of contaminant per volume of air (often in parts per million), it is necessary to convert the volume of contaminant into a mass. Conversion factors are given in Annex D.

3.10

effluent concentration

C_2

homogeneous challenge gas concentration measured after (downstream of) the filter

NOTE Contaminant concentrations are generally expressed as mass concentrations, i.e. mass of contaminant in milligrams per cubic metre of air. However, when the contaminant is measured as a volume fraction, i.e. volume of contaminant per volume of air (often in parts per million), it is necessary to convert the volume of contaminant into a mass. Conversion factors are given in Annex D.

3.11**efficiency**

ratio of the amount of contaminant removed or reduced by the filter relative to the amount exposed to it, calculated as a percentage by

$$E = \frac{100(C_1 - C_2)}{C_1} \quad (1)$$

where

E is efficiency,

C_1 is the influent concentration,

C_2 is the effluent concentration

3.11.1**1 min efficiency**

efficiency measurement 1 min after time zero, t_0

3.11.2**2 min efficiency**

efficiency measurement 2 min after t_0

3.11.3**5 min efficiency**

efficiency measurement 5 min after t_0

3.12**time zero**

t_0

calculated zero point based on the shape of the ramp-up curve of challenge gas breakthrough versus time

NOTE 1 See Clause 8 and Annex B.

NOTE 2 Once this curve is obtained, the t_0 point can be found by calculation. All efficiency or penetration data are calculated from the designated t_0 .

3.13**start of test time**

t_{start}

time at which the challenge gas is introduced into the test system

3.14**lag time**

t_{lag}

time difference between t_{start} and t_0

NOTE See Annex B.

3.15**end of test time**

t_f

time at which a user-specified efficiency (typically 5 %) or user-specified time is reached

3.16**total test time**

duration of exposure of the filter to the challenge gas, beginning at t_0