
**Tobacco and tobacco products — Draw
resistance of cigarettes and pressure drop
of filter rods — Standard conditions and
measurement**

*Tabac et produits du tabac — Résistance au tirage des cigarettes et perte
de charge des bâtonnets-filtres — Conditions normalisées et mesurage*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6565:2002

<https://standards.iteh.ai/catalog/standards/sist/cf214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>



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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 6565:2002](#)

<https://standards.iteh.ai/catalog/standards/sist/c214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>

© ISO 2002

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.ch
Web www.iso.ch

Printed in Switzerland

Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Test conditions	2
5 Instrument calibration	3
6 Procedure	3
7 Expression of results	3
8 Precision.....	3
9 Test report	4
Annex A (normative) Calibration of draw resistance or pressure drop instruments using pressure drop transfer standards	6
Annex B (normative) Calibration of pressure drop transfer standards	7
Annex C (informative) Results of an interlaboratory trial	9
Annex D (informative) Comparison of draw resistance or pressure drop measurement: Critical flow orifice instruments vs. constant mass flow instruments	14
Bibliography	16

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6565 was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 1, *Physical and dimensional tests*.

This third edition cancels and replaces the second edition (ISO 6565:1999), of which definitions 3.1 and 3.2 have been revised.

Annexes A and B form a normative part of this International Standard. Annexes C and D are for information only.

<https://standards.iteh.ai/catalog/standards/sist/c214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>

Introduction

The draw resistance of cigarettes or the pressure drop of filter rods is a widespread and important concept both for product quality specifications and for analytical determinations by mechanical smoking.

Different procedures and apparatus are currently available for this determination. It has so far not been possible to standardize the complete description of the equipment to be used and the detailed procedure. Nevertheless, it has been possible to obtain broad consensus on the definitions to be adopted and the conditions that allow comparable determinations of this characteristic to be made. In order to achieve this, one of the main requirements is the use of transfer standards for the calibration of instruments (see annexes A and B).

In this International Standard, the results are given in pascals (Pa). For information, they are also given in millimetres of water (mmH₂O).

The values given previously in millimetres of water (mmH₂O) are converted into pascals (Pa) using the following correction factor:

$$1 \text{ mmH}_2\text{O} = 9,806 \text{ 7 Pa}$$

For practical use, the values have been rounded.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 6565:2002](https://standards.iteh.ai/catalog/standards/sist/c214342-343e-450b-ac2d-fd8656dce57/iso-6565-2002)

<https://standards.iteh.ai/catalog/standards/sist/c214342-343e-450b-ac2d-fd8656dce57/iso-6565-2002>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6565:2002

<https://standards.iteh.ai/catalog/standards/sist/cf214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>

Tobacco and tobacco products — Draw resistance of cigarettes and pressure drop of filter rods — Standard conditions and measurement

1 Scope

This International Standard describes a method for the measurement of the draw resistance of cigarettes and pressure drop of filter rods, and specifies the standard conditions applicable to such measurements.

It is applicable to cigarettes, filter rods and, by extension, to cylindrical tobacco products similar to cigarettes.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

[ISO 6565:2002](#)

ISO 3402, *Tobacco and tobacco products — Atmosphere for conditioning and testing*

ISO 10185, *Tobacco and tobacco products — Vocabulary*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 10185 and the following apply.

3.1

pressure drop

static pressure difference between the two ends of

- a test piece completely encapsulated in a measuring device such that no air can pass through the outer membrane (or wrapping), or
- a pneumatic circuit,

when it is traversed by an air flow under steady conditions in which the measured volumetric flow, under standard conditions, at the output end is 17,5 ml/s, as defined in ISO 3402

3.2

draw resistance

negative pressure which has to be applied to the output end, under test conditions (see ISO 3402), in order to sustain a volumetric flow of 17,5 ml/s, exiting at the output end, when the cigarette is encapsulated in a measurement device to a depth of 9 mm, as defined in ISO 3308

NOTE 1 Any ventilation zones and the tobacco rod are exposed to the atmosphere.

NOTE 2 Measurement values are expressed in pascals (Pa). They used to be expressed in millimetres water gauge (mm WG). The values given previously in mm WG are converted into pascals using the following conversion factor:

$$1 \text{ mm WG} = 9,806 \text{ 7 Pa.}$$

NOTE 3 The concept of draw resistance may also be subjectively judged when a cigarette is smoked by a consumer/taste panel. Under such circumstances, draw resistance is not measured objectively because the conditions of the formal definition are not met.

**3.3
input end**

that end of the test piece intended to be lit in the case of a cigarette

**3.4
output end**

that end opposite from the input end

**3.5
standard direction of flow**

direction from the input end to the output end

NOTE In the case of a filter rod, the input end and the output end are defined by the direction of flow.

4 Test conditions

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4.1 Test conditions common to cigarettes and filter rods

4.1.1 General

<https://standards.iteh.ai/catalog/standards/sist/c214342-343e-450b-ac2d-f18656dccc57/iso-6565-2002>

The test conditions shall be constant and in agreement with the conditions under which the calibration was performed (see clause 5).

4.1.2 Air flow

The air flow shall be from the input end in the standard direction of flow (see 3.5).

4.1.3 Position

The position of the test piece may be either horizontal or vertical, but products with cavities containing loose-fill material shall be positioned vertically.

4.2 Conditions particular to cigarettes: Insertion of the test piece

The output end of the test piece shall be inserted into a measurement device encapsulated to a depth of 9 mm.

The products should be handled with care, particularly if they are to be smoked afterwards.

4.3 Conditions particular to filter rods: Encapsulation

The test piece shall be completely encapsulated in a measuring device so that no air can pass through the filter rod wrapping.

5 Instrument calibration

The instrument shall be calibrated before normal testing using transfer standards. This shall be done at least once per day. The calibration shall be carried out in accordance with annex A. The instrument shall be recalibrated if the atmospheric conditions change by more than 2 °C for temperature and/or 5 % for relative humidity.

Each calibration of the instrument shall be recorded for later reference.

6 Procedure

6.1 Conditions common to vacuum and pressure instruments

Insert the test piece (either manually or automatically) into the measuring device of the instrument. Read the value of the draw resistance or pressure drop and record it.

6.2 Conditions particular to vacuum instruments

Before reading the draw resistance or pressure drop, leave the test piece in the measuring device until the reading is steady.

NOTE Practice has shown that a settling time of 4 s to 6 s is normally sufficient.

6.3 Conditions particular to pressure instruments (for filter rods only)

Determine the required settling time depending on the draw resistance of the test piece and the type of instrument. The reading for pressure drop shall be recorded at a constant time after the insertion of the test piece.

NOTE For the particular conditions described in 6.2 and 6.3, practice has shown that for low draw resistance or pressure drop, i.e. below 2 000 Pa (or about 200 mmH₂O), a settling time of 2 s to 3 s is sufficient, while for higher draw resistances or pressure drop, i.e. above 4 000 Pa (or about 400 mmH₂O), a settling time of 4 s to 6 s is required.

The settling time should be recorded in the test report.

7 Expression of results

The expression of the laboratory results depends on the purpose for which the data are required and the level of laboratory precision.

Express the results as follows:

- average draw resistance or pressure drop: in pascals to the nearest 10 Pa (in mmH₂O to the nearest 1 mmH₂O);
- standard deviation of the draw resistance or pressure drop of the test piece: in pascals to the nearest 1 Pa (in mmH₂O to the nearest 0,1 mmH₂O).

8 Precision

8.1 Interlaboratory test

Details of an interlaboratory test on the precision of the method are summarized in annex C. The values derived from this interlaboratory test may not be applicable to values and matrices other than those given.

8.2 Repeatability

The absolute difference between two independent single results, obtained using the same method on identical test material in the same laboratory by the same operator using the same equipment within a short interval of time, will in not more than 5 % of cases be greater than the values given in Table 1 for cigarettes and Table 2 for filter rods.

Table 1 — Cigarettes

Repeatability limit, <i>r</i>	
Pa	mmH ₂ O
<i>r</i> = 23	<i>r</i> = 2,3

Table 2 — Filter rods

Repeatability limit, <i>r</i>	
Pa	mmH ₂ O
<i>r</i> = 0,007 × <i>m</i>	<i>r</i> = 0,007 × <i>m</i>
NOTE <i>m</i> is the mean value of the pressure drop in pascals (Pa) (or in mmH ₂ O).	

8.3 Reproducibility

iTeh STANDARD PREVIEW

The absolute difference between two single test results, obtained using the same method on identical test material in different laboratories with different operators using different equipment, will in not more than 5 % of cases be greater than the values given in Table 3 for cigarettes and Table 4 for filter rods.

ISO 6565:2002

<https://standards.iteh.ai/catalog/standards/sist/c714342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>

Table 3 — Cigarettes

Reproducibility limit, <i>R</i>	
Pa	mmH ₂ O
<i>R</i> = 57	<i>R</i> = 5,8

Table 4 — Filter rods

Reproducibility limit, <i>R</i>	
Pa	mmH ₂ O
<i>R</i> = 0,023 × <i>m</i>	<i>R</i> = 0,023 × <i>m</i>
NOTE <i>m</i> is the mean value of the pressure drop in pascals (Pa) (or in mmH ₂ O).	

9 Test report

The test report shall show the method used and the results obtained. It shall also mention any operating conditions not specified in this International Standard or regarded as optional, as well as any circumstances that may have influenced the results.

The test report shall include all details required for the complete identification of the sample.

It shall mention, in particular, the following information:

- product name or identification;
- date of sampling;
- date of test;
- type of instrument used and, if possible, settling time;
- total number of test pieces tested;
- room temperature in degrees Celsius (°C) during testing;
- relative humidity in percentage (RH %) during testing.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 6565:2002](https://standards.iteh.ai/catalog/standards/sist/cf214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002)

<https://standards.iteh.ai/catalog/standards/sist/cf214342-343e-450b-ac2d-fd8656dccc57/iso-6565-2002>