



SLOVENSKI STANDARD  
SIST ISO 9512:2002

01-september-2002

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Cigarettes -- Determination of ventilation -- Definitions and measurement principles

Cigarettes -- Détermination du taux de ventilation -- Définitions et principes de mesurage  
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**ICS:**

65.160 V[ àæ È[ àæ } àæ à^| àæ Tobacco, tobacco products  
[ ] !^ { æ and related equipment

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# INTERNATIONAL STANDARD

**ISO**  
**9512**

Second edition  
2002-06-15

Corrected version  
2002-12-15

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## **Cigarettes — Determination of ventilation — Definitions and measurement principles**

*Cigarettes — Détermination du taux de ventilation — Définitions et  
principes de mesurage*

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Reference number  
ISO 9512:2002(E)

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## ISO 9512:2002(E)

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## Contents

Foreword .....	iv
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Principle .....	3
5 Standard conditions .....	3
6 Requirements for apparatus .....	3
7 Sampling .....	5
8 Checking of apparatus .....	5
9 Procedure .....	5
10 Expression of results .....	6
11 Precision .....	6
12 Test report .....	6
<b>Annex A</b> (normative) <b>Calibration of ventilation standards</b> .....	7
<b>Annex B</b> (normative) <b>Calibration of ventilation measurement instruments using ventilation and pressure drop standards</b> .....	11
<b>Annex C</b> (informative) <b>Measurement of ventilation airflows of cigarettes</b> .....	13
<b>Annex D</b> (informative) <b>Determination of the leakage of the ventilation measurement system</b> .....	15
<b>Annex E</b> (informative) <b>Results of interlaboratory test</b> .....	19

**ISO 9512:2002(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.

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 9512 was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 1, *Physical and dimensional tests*.

This second edition cancels and replaces the first edition (ISO 9512:1993), which has been technically revised.

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

This corrected version of ISO 9512:2002 incorporates the following corrections. Figures 1 b) and d) have been corrected and a few minor editorial changes have been made.

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# Cigarettes — Determination of ventilation — Definitions and measurement principles

## 1 Scope

This International Standard specifies a method for the determination of ventilation which is applicable 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 3308, *Routine analytical cigarette-smoking machine — Definitions and standard conditions*

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

ISO 6565, *Tobacco and tobacco products — Draw resistance of cigarettes and pressure drop of filter rods — Standard conditions and measurement*

## 3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

### 3.1 ventilation

aspiration of atmospheric air into an unlit cigarette other than through its front area

NOTE Dilution is the effect of ventilation on the smoke concentration.

### 3.2 front area

that end of a cigarette which is intended to be lit

### 3.3 total airflow

100 % of the volumetric airflow leaving the mouth end of an unlit cigarette which is encapsulated in a measurement device having an insertion depth as defined in ISO 3308

NOTE Under standard test conditions, the total airflow,  $Q$ , is 17,5 ml/s.

### 3.4 generator for total airflow

device to maintain a constant total airflow at the exit of the mouth end of a cigarette when encapsulated in a measurement head having an insertion depth as defined in ISO 3308

**ISO 9512:2002(E)****3.5****ventilation airflow**

volumetric airflow entering an unlit cigarette other than through the front area of the cigarette

NOTE The ventilation airflow is standardized to the negative pressure at the mouth end of the cigarette, created by the draw resistance of the cigarette when encapsulated in a measurement device having an insertion depth as defined in ISO 3308.

**3.6****total ventilation**

total amount of lateral air entering the cigarette (other than through its front area) when encapsulated in a measurement device having an insertion depth as defined in ISO 3308

**3.7****degree of ventilation**

ratio, expressed as a percentage, of the ventilation airflow to the total airflow

See Figures 1 b), 1 c) and 1 d).

**3.8****components of total ventilation**

that air entering through the cigarette paper, and through the materials comprising and attaching the filter to the tobacco rod, contributing to total ventilation

See Figures 1 b), 1 c) and 1 d).

**3.9****filter ventilation**

that air entering the cigarette through the filter joining paper (tipping paper) between the covered part of the mouth end and the beginning of the tobacco rod

See Figure 1 b).

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**3.10****paper ventilation**

that air entering the cigarette through the envelope covering the whole length of the tobacco rod

See Figure 1 b).

**3.11****butt ventilation**

that air entering the cigarette between the covered part of the mouth end of the cigarette and the position defined by the butt length appropriate to the cigarette

See Figure 1 c).

**3.12****burnable tobacco rod ventilation**

that air entering the cigarette through its paper between the position defined by the butt length appropriate to the cigarette and the end of the cigarette which would be lit

See Figure 1 c).

**3.13****tipping-paper ventilation**

that air entering the cigarette through the filter joining paper (tipping paper) between the covered part of the mouth end and the tobacco rod end of the tipping paper

See Figure 1 d).



**3.14****cigarette-paper ventilation**

air entering the cigarette through the cigarette paper between the end of the cigarette which would be lit and the mouth end of the tipping paper

See Figure 1 d).

**4 Principle**

Air is drawn, at a constant flow rate, in the standard smoking direction through an unlit cigarette. The individual components of ventilation are measured separately. The degrees of ventilation are obtained by calculation.

**5 Standard conditions**

**5.1** Prior to measurement, the cigarettes shall be conditioned in an atmosphere as specified in ISO 3402.

**5.2** Ventilation measurements shall be made on unlit cigarettes in accordance with the test atmosphere as specified in ISO 3402.

**5.3** The direction of airflow in the cigarette shall be that which would occur when the cigarette is smoked.

**6 Requirements for apparatus**

**6.1** The apparatus used shall allow separate assessment of the ventilation components shown in Figure 1.

**6.2** The cigarettes shall be held in the measurement head by an encapsulation device, with an encapsulation depth as defined by ISO 3308.

**6.3** Seals used to hold the cigarette and partition ventilation measurement regions shall be sized and positioned appropriately to the dimensions of the product under test to minimise any systematic influence on measured parameters. See Figure 2.

**6.4** The measuring pressure surrounding the cigarette contained in the measurement head, other than at the front end and the mouth end enclosed in the holding seal, shall not be more than 20 Pa lower than that of the testing atmosphere when the total airflow is applied.

**NOTE** Experiments conducted during the development of this method show that the measured ventilation flows reduce proportionally to increased pressure drop of the apparatus' ventilation measurement path.

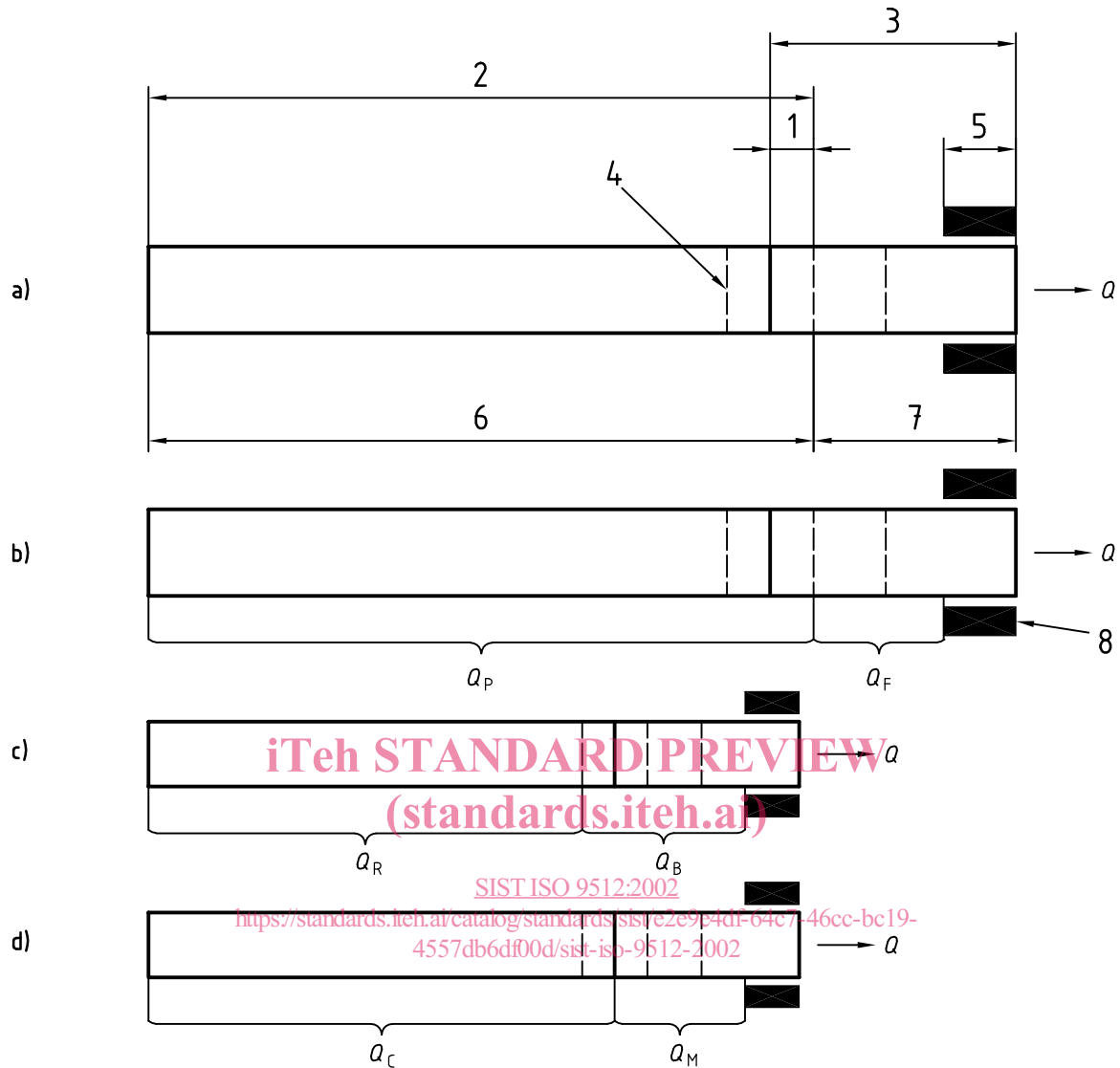
**6.5** A generator for total airflow shall be used to establish the measurement conditions.

Deviations from the total airflow shall not exceed  $\pm 0,10$  ml/s.

**NOTE** A critical flow orifice (CFO) is normally used to establish a constant total airflow for vacuum-based measurement systems.

**6.6** The device used for measurement of ventilation airflows shall have no intrinsic effect on the volumetric airflow measurement.

See Figure 2.

**Key**

- 1 Overlap
- 2 Cigarette paper
- 3 Tipping paper
- 4 Butt mark
- 5 Standard depth of encapsulation (ISO 3308)
- 6 Tobacco rod
- 7 Filter
- 8 Encapsulation device

Total airflow,  $Q = 17,5$  ml/s

$$\text{Degree of filter ventilation, } V_F = \frac{Q_F}{Q} \times 100 \%$$

$$\text{Degree of paper ventilation, } V_P = \frac{Q_P}{Q} \times 100 \%$$

$$\text{Degree of total ventilation, } V = V_F + V_P = \frac{Q_F + Q_P}{Q} \times 100 \%$$

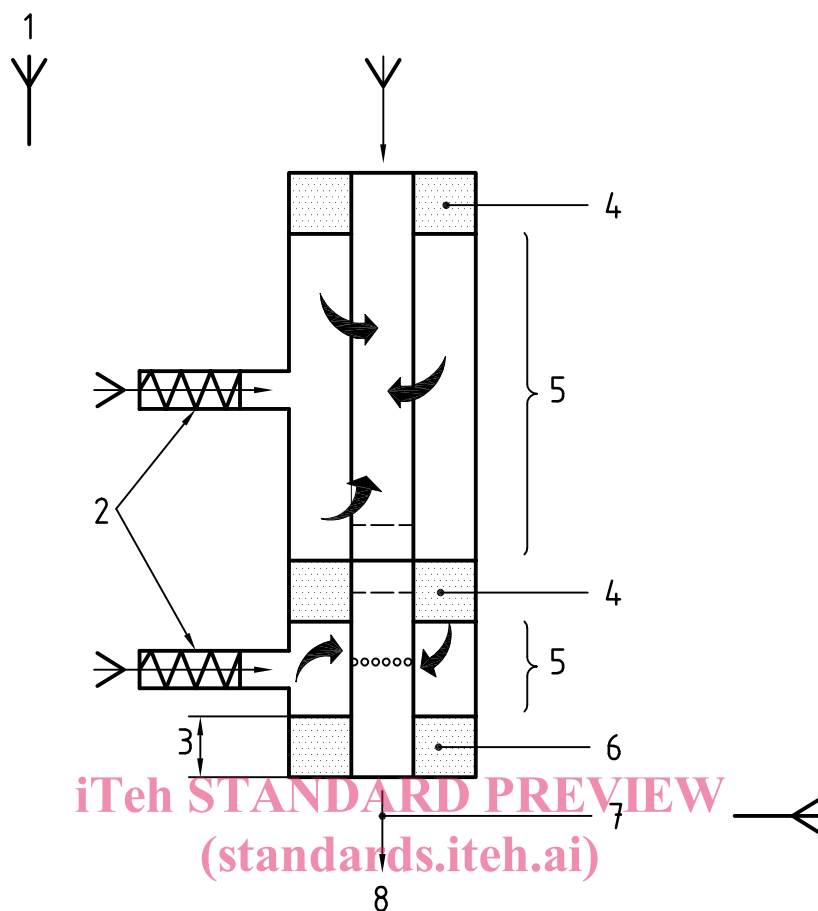
$$\text{Degree of burnable tobacco rod ventilation, } V_R = \frac{Q_R}{Q} \times 100 \%$$

$$\text{Degree of butt ventilation, } V_B = \frac{Q_B}{Q} \times 100 \%$$

$$\text{Degree of cigarette paper ventilation, } V_C = \frac{Q_C}{Q} \times 100 \%$$

$$\text{Degree of tipping paper ventilation, } V_M = \frac{Q_M}{Q} \times 100 \%$$

**Figure 1 — Different degrees of ventilation**



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#### Key

- |   |  |   |   |
|---|--|---|---|
| 1 | Test atmosphere conforming to ISO 3402     | 5 | Ventilation chamber                         |
| 2 | Ventilation flow measurement devices       | 6 | Fixed holding seal                          |
| 3 | Encapsulation depth conforming to ISO 3308 | 7 | Device to measure cigarette draw resistance |
| 4 | Adjustable partitioning seals              | 8 | Total airflow                               |

Figure 2 — Schematic for ventilation flow measurement

## 7 Sampling

A sample shall be taken which is representative, on a statistical basis, of the population to be characterized.

Samples shall be free of visible defects and creases, which may impair measurement performance.

## 8 Checking of apparatus

The measurement device shall be calibrated in accordance with the manufacturer's recommendations, ensuring the device is leakfree prior to implementing or checking calibration.

## 9 Procedure

### 9.1 Conditioning of test cigarettes

Condition the cigarette sample selected for the test as specified in 5.1.