
**Cigarettes — Determination of loss of
tobacco from the ends —**

Part 2:

**Method using a rotating cubic box
(sismelatophore)**

*Cigarettes — Détermination de la perte de tabac par les extrémités —
Partie 2: Méthode utilisant une boîte rotative cubique (sismélatophore)*



Foreword

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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.

International Standard ISO 3550-2 was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 1, *Physical and dimensional tests*.

ISO 3550 consists of the following parts, under the general title *Cigarettes — Determination of loss of tobacco from the ends*:

- Part 1: Method using a rotating cylindrical cage
- Part 2: Method using a rotating cubic box (*sismelatophore*)

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Introduction

The loss of tobacco from cigarette ends, which particularly affects short strands, is a nuisance for the industry as well as for the consumer.

From this standpoint, the greater a cigarette's resistance to loss from its ends, the higher its quality.

The measuring devices available are based on the rotation of a cigarette-containing device. This International Standard describes two particular types of devices. The first, described in ISO 3550-1, comprises a rotating cylindrical cage through which tobacco is allowed to fall into a weighing vessel; the second, described in this part of ISO 3550, uses a cubic box rotating about its main diagonal axis.

The first system principally permits determination of losses undergone by the cigarette during the manufacturing and packaging processes, and the second one losses undergone throughout the distribution network and in the smoker's pocket.

The two methods are not mutually exclusive and other acceptable methods exist which are based upon slightly different types of device.

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Cigarettes — Determination of loss of tobacco from the ends —

Part 2:

Method using a rotating cubic box (sismelatophore)

1 Scope

This part of ISO 3550 specifies a method for the determination of loss of tobacco from cigarette ends using a cubic rotative box (sismelatophore).

It applies mainly to the determination of the losses undergone throughout the distribution network and in the smoker's pocket.

NOTE — A method of determination of loss of tobacco from the ends using a rotating cylindrical cage is described in ISO 3550-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3550. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3550 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2971:—¹, *Cigarettes and filter rods — Determination of nominal diameter — Method using the laser beam measuring apparatus.*

ISO 3402:1991, *Tobacco and tobacco products — Atmosphere for conditioning and testing.*

ISO 6488:—², *Tobacco — Determination of water content — Karl Fischer method.*

ISO 8243:1991, *Cigarettes — Sampling.*

3 Principle

A test portion of a given number of cigarettes is subjected to a random series of impacts repeated in such a way as to bring about artificially a loss of tobacco strands at the ends.

These impacts are achieved by tumbling the portion in a cubic box revolving uniformly around an axis coincident with a principal diagonal.

The tobacco loss, expressed in parts per thousand (‰), is given by calculating the ratio of the loss of mass of cigarettes in a given time to the initial mass of the test portion.

As a first result of the test, the mass, m_L , of tobacco falling from the test portion is determined. From this mass, m_L , and the non-tobacco mass, m_2 (cigarette paper, filter, glue, etc.), the characteristics of the

¹ To be published. (Revision of ISO 2971:1987)

² To be published. (Revision of ISO 6488:1981)

cigarette (i.e. the loss rate of tobacco, the loss of tobacco per open end and per unit cross section of the open end) are determined.

4 Apparatus

4.1 Conditioning chamber, capable of controlling the enclosed atmosphere in accordance with the requirements of ISO 3402.

4.2 Cubic rotating box (sismelatophore) (see figure 1), consisting of:

a) a cubic box, made of poly(methyl methacrylate) or any other plastics material having equivalent properties, the inside edge of which measures $140 \text{ mm} \pm 5 \text{ mm}$, held by two trihedral supports in such a way that one of the principal diagonals is horizontal; one of the faces of the cubic box can be opened (groove or hinge);

b) one half-spindle, clamped to a timing micromotor device, which rotates the cube at $60 \text{ min}^{-1} \pm 2 \text{ min}^{-1}$. The other half-spindle supports a spring which holds the cube in position during rotation; this allows the cube to be freed for filling or emptying;

c) a time-switch for regulating the duration of operation of the micromotor.

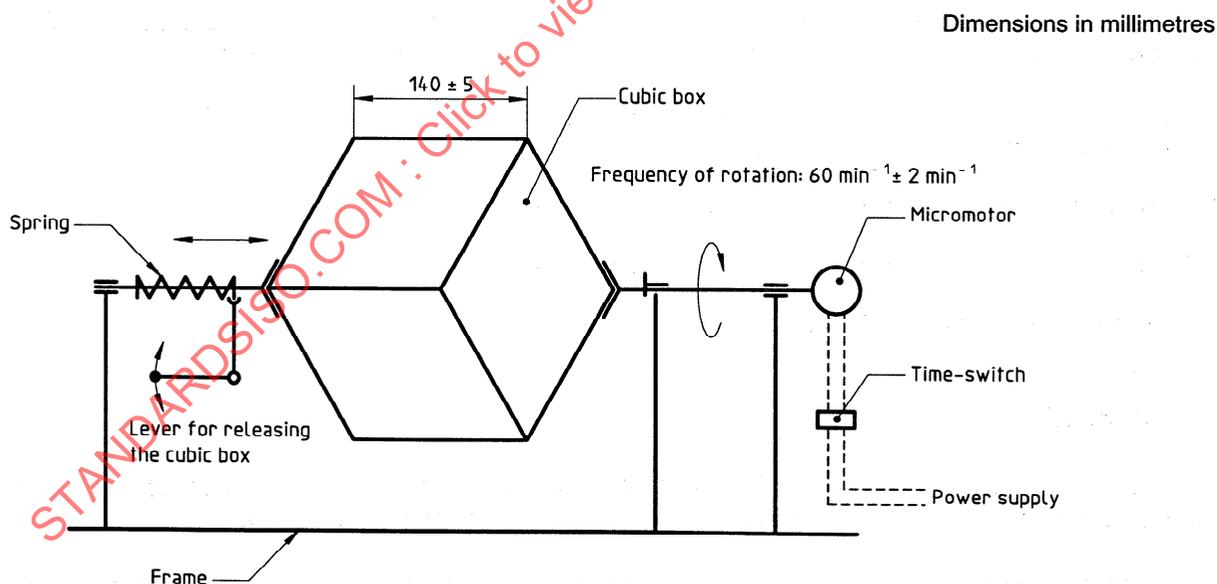


Figure 1 — Cubic rotating box (sismelatophore)

4.3 Device for the measurement of the diameter of the cigarettes, in accordance with ISO 2971.

4.4 Analytical balance, capable of weighing to an accuracy of $\pm 0,000$ 1 g.

5 Sampling

Carry out sampling in accordance with one of the procedures given in ISO 8243 where applicable or, if not, by a procedure relevant to the aim of the test. In the latter case, an appropriate reference to, or details of, the sampling procedure used shall be given in the test report.

6 Procedure

6.1 Conditioning of test sample

Place the test sample in the conditioning chamber (4.1) and condition the sample in accordance with ISO 3402.

6.2 Test portion

Take, as the test portion, 20 cigarettes from the conditioned test sample (see 6.1).

6.3 Determination of water content

Take a new test portion conditioned as specified in 6.1 and determine the water content in accordance with ISO 6488.

NOTE — Although the water content is not used when calculating the loss of tobacco from cigarette ends, it may affect the results considerably. The water content should, therefore, be determined and reported.

6.4 Determination

6.4.1 Operate in the test atmosphere specified in ISO 3402.

6.4.2 Determine the mean diameter of the cigarettes to be tested to the nearest 0,001 mm in accordance with ISO 2971.

6.4.3 Weigh the test portion (6.2) to the nearest 0,001 g, m_0 , immediately introduce it into the sismelatore (4.2) and operate the apparatus for $120 \text{ s} \pm 6 \text{ s}$.

NOTE — This duration was selected experimentally as giving good sensitivity in an acceptable time.

6.4.4 Open the apparatus and remove the cigarettes with care.

6.4.5 Weigh the test portion again to the nearest 0,001 g after tumbling (m_1) and calculate the fallout quantity $(m_0 - m_1) = m_L$ or weigh directly the mass of the debris collected from the apparatus. Cut the paper lengthways with a sharp blade and separate the tobacco from the paper, adhesive and, if necessary, from the filter (in the case of filter cigarettes). Weigh separately materials other than tobacco (corresponding to mass m_2).

Repeat the test 5 to 10 times according to the accuracy desired.

7 Calculation

7.1 Loss rate

The rate of loss, expressed in parts per thousand (‰), of the tobacco from the ends of plain or filter cigarettes is given by the formula :

$$1000 \left(\frac{m_0 - m_1}{m_0 - m_2} \right)$$

or

$$1000 \left(\frac{\Delta m}{m_0 - m_2} \right)$$

where

m_0 is the initial mass, in grams, of the test portion;

m_1 is the mass, in grams, of the test portion after tumbling;

m_2 is the mass, in grams, of the cigarette paper together with the filter, the glue, etc.;

Δm is the loss of mass, in grams, of the cigarettes during tumbling.

7.2 Calculation of specific tobacco fallout values

7.2.1 End-related tobacco fallout

The mass of the end-related tobacco fallout, m_{LOE} , in milligrams per open end, is given by

$$m_{LOE} = \frac{m_L}{q \cdot q_{OE}}$$

7.2.2 Area-related tobacco fallout

The mass of the area-related tobacco fallout, m_{LOA} , in milligrams per square centimetre of open end, is given by

$$m_{LOA} = \frac{m_L}{q \cdot A \cdot q_{OE}}$$

where

m_L is the mass of fallout, in milligrams, related to the test portion;

A is the area, in square centimetres, of one open end;

q is the number of cigarettes in the test portion;

q_{OE} is the number of open ends per cigarette.

NOTE — q_{OE} is equal to 1 for filter cigarettes and 2 for plain cigarettes.

8 Test report

The test report shall include the following information:

- all information necessary for the complete identification of the sample(s);
- characteristic data of cigarettes (length, diameter, number of open ends);
- method and date of sampling;
- date of testing;
- number of cigarettes in the test sample;
- water content;
- number of single measuring results;
- mean value for the single measuring results;
- minimum and maximum value of single measuring results;
- standard deviation for the single measuring results if their number is > 3 ;
- coefficient of variation for the single measuring results if their number is > 3 .

It shall also mention any operating conditions not specified in this part of ISO 3550 as well as any circumstances which may have influenced the results.

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