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**Fine-cut tobacco and smoking articles  
made from it — Methods of sampling,  
conditioning and analysis —**

Part 3:

**Determination of total particulate  
matter of smoking articles using a  
routine analytical smoking machine,  
preparation for the determination of  
water and nicotine, and calculation of  
nicotine-free dry particulate matter**

*Tabac à rouler et objets confectionnés à partir de ce type de tabac —  
Méthodes d'échantillonnage, de conditionnement et d'analyse —*

*Partie 3: Dosage de la matière particulaire totale des objets à fumer  
au moyen d'une machine à fumer analytique de routine, préparation  
pour le dosage de l'eau et de la nicotine, et calcul de la matière  
particulaire anhydre et exempte de nicotine*



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## 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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*.

This third edition cancels and replaces the second edition (ISO 15592-3:2008), which has been technically revised.

The main changes are as follows:

- the Introduction has been revised;
- the Normative references have been updated;
- a new term "expanded tobacco" has been added;
- requirement for fine-cut smoking articles with 5,2 mm diameter has been deleted;
- Teepol L has been deleted;
- the unit for the average draw resistance has been extended by mm WG (water gauge);
- former Annex A "Summary of report of the CORESTA task force on roll-your-own (fine-cut) tobacco" has been deleted and subsequent annexes have been relabelled;
- the wrapper specifications for wrapper type A have been modified for filler CaCO<sub>3</sub>, whiteness and opacity (new [Annex A](#));
- wrapper specifications for wrapper type B have been deleted;
- a new [Annex B](#) "Expanded tobacco" has been added;
- Annex C "Classification of wrappers" has been deleted;
- Annex D "Fine-cut tobacco stated to be used with specified wrappers" has been deleted;
- Annex E "Effect of incorporation of loose filters" has been deleted;

— the Bibliography has been updated.

A list of all parts in the ISO 15592 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

Smokers make smoking articles by enclosing fine-cut tobacco in a suitable wrapper (sometimes incorporating a filter) either by hand or by using a rolling/tubing machine. The scientific literature has shown that the quantity of fine-cut tobacco, the type of wrapper chosen and the size of the articles made vary widely between consumers and between countries<sup>[1]</sup>.

When the article is smoked, the yield of nicotine free dry particulate matter [NFDPM (sometimes referred to as "tar")] and nicotine is determined by the construction of the article. This document has been developed to specify how articles are made in the laboratory, how they are tested. Fine-cut smoking articles made by consumers can therefore differ from the fine-cut smoking articles made for the purpose of testing described in this document.

One smoking article is made using one mass of fine-cut tobacco and one tube made from a specified wrapper (see [Annex A](#)).

It should be noted that because the use of fine-cut tobacco is so dependent on the way in which an individual makes a smoking article, a comparison of the smoke yield with the single result from factory-manufactured cigarettes according to ISO 4387 is of limited value.

This document also gives further necessary procedures as follows in [Annex B](#).

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# Fine-cut tobacco and smoking articles made from it — Methods of sampling, conditioning and analysis —

## Part 3:

# Determination of total particulate matter of smoking articles using a routine analytical smoking machine, preparation for the determination of water and nicotine, and calculation of nicotine-free dry particulate matter

## 1 Scope

This document specifies methods for the determination of total particulate matter and preparation for the subsequent determination of nicotine-free dry particulate matter present in the smoke from articles made from fine-cut tobacco and expanded tobacco, generated and collected using a routine analytical smoking machine.

It specifies the method of making of fine-cut tobacco smoking articles using a tube made from a specified wrapper.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3308:2012, *Routine analytical cigarette-smoking machine — Definitions and standard conditions*

ISO 4387, *Cigarettes — Determination of total and nicotine-free dry particulate matter using a routine analytical smoking machine*

ISO 6488, *Tobacco and tobacco products — Determination of water content — Karl Fischer method*

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

ISO 10315, *Cigarettes — Determination of nicotine in total particulate matter from the mainstream smoke — Gas-chromatographic method*

ISO 10362-1, *Cigarettes — Determination of water in total particulate matter from the mainstream smoke — Part 1: Gas-chromatographic method*

ISO 15592-1, *Fine-cut tobacco and smoking articles made from it — Methods of sampling, conditioning and analysis — Part 1: Sampling*

ISO 15592-2, *Fine-cut tobacco and smoking articles made from it — Methods of sampling, conditioning and analysis — Part 2: Atmosphere for conditioning and testing*

ISO 16055, *Tobacco and tobacco products — Monitor test piece for smoking machine — Requirements and use*

### 3 Terms, definitions and symbols

#### 3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

##### 3.1.1

###### **fine-cut tobacco**

tobacco produced to be used by consumers for making their own smoking articles

##### 3.1.2

###### **fine-cut smoking article**

###### **FCSA**

article, suitable for smoking, produced by combining *fine-cut tobacco* (3.1.1) with a *wrapper* (3.1.4)

##### 3.1.3

###### **expanded tobacco**

tobacco, which has increased in size by a process of cellular expansion

##### 3.1.4

###### **wrapper**

paper specially prepared and supplied in a form suitable for enclosing *fine-cut tobacco* (3.1.1) so as to produce a smoking article

##### 3.1.5

###### **total particulate matter**

###### **TPM**

portion of the mainstream smoke which is retained in the smoke trap

##### 3.1.6

###### **dry particulate matter**

###### **DPM**

*total particulate matter* (3.1.5) after deduction of its water content

##### 3.1.7

###### **nicotine-free dry particulate matter**

###### **NFDPM**

*dry particulate matter* (3.1.6) after deduction of its nicotine content

##### 3.1.8

###### **smoking process**

use of a smoking machine to smoke *fine-cut smoking articles* (3.1.2) from lighting to final puff

##### 3.1.9

###### **smoking run**

specific *smoking process* (3.1.8) to produce such smoke from a sample of *fine-cut smoking articles* (3.1.2) as is necessary for the determination of the smoke components

##### 3.1.10

###### **laboratory fine-cut tobacco sample**

sample of *fine-cut tobacco* (3.1.1) intended for laboratory inspection or testing and which is representative of the gross sample or the sub-period sample

**3.1.11****conditioned laboratory fine-cut tobacco sample**

sub-sample of *fine-cut tobacco* (3.1.1) selected from the *laboratory fine-cut tobacco sample* (3.1.10) and conditioned prior to making *laboratory fine-cut smoking articles* (3.1.12)

**3.1.12****laboratory fine-cut smoking article**

*fine-cut smoking articles* (3.1.2) made from the *conditioned laboratory fine-cut tobacco sample* (3.1.11)

**3.1.13****test sample**

*fine-cut smoking articles* (3.1.2) for test taken at random from the *laboratory fine-cut smoking articles* (3.1.12) and which are representative of the laboratory fine-cut smoking articles

**3.1.14****test portion**

group of *fine-cut smoking articles* (3.1.2) prepared for a single determination of TPM and which is taken at random from the *test sample* (3.1.13)

**3.1.15****butt length**

length of unburned *fine-cut smoking article* (3.1.2) remaining at the moment when the smoking is stopped

**3.1.16****insertion depth**

length from the butt end to which a *fine-cut smoking article* (3.1.2) is inserted into the holder

**3.1.17****filling power**

measure of the volume occupied by a given mass of *fine-cut tobacco* (3.1.1) when a given pressure is applied

**3.1.18****firmness**

property of a tobacco rod measured through its deformation when subjected to a given load

**3.2 Symbols**

The following symbols are used in 9.1 and 9.5:

$N$	is the number of FCSAs of a given group to be smoked, resulting from sampling at one point in time or from a sub-period sample;
$C$	is a multiplying factor, value $\geq 1$ , to allow for loss due to damage or selection procedures between initial sampling and smoking;
$n$	is the number of replicate determinations of total particulate matter;
$q$	is the number of FCSAs smoked into the same trap;
$Q$	is the total number of FCSAs ( <i>laboratory fine-cut smoking articles</i> , see 3.1.12).

**4 Principle**

The fine-cut tobacco is sampled and conditioned prior to manufacturing laboratory fine-cut smoking articles. The laboratory fine-cut smoking articles are made from the conditioned laboratory fine-cut tobacco sample, are conditioned, then smoked by a routine analytical cigarette-smoking machine, with simultaneous collection of the total particulate matter in a glass fibre filter trap. If considered