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Cigarettes — Determination of nicotine-free dry particulate matter and nicotine in sidestream smoke — Method using a routine analytical linear smoking machine equipped with a fishtail chimney

Cigarettes — Détermination de la matière particulaire anhydre et exempte de nicotine et de la nicotine dans le courant secondaire de fumée — Méthode utilisant une machine à fumer analytique de routine linéaire équipée d'une cheminée individuelle en forme de queue de poisson



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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 126, *Tobacco and tobacco products*.

This second edition cancels and replaces the first edition (ISO 20773:2007), which has been editorially revised.

Introduction

Cigarettes are manufactured to close tolerances using strict quality control procedures.

However, the main constituents involved in the manufacture are derived from natural products (such as tobacco and paper) and this results in a final product which is intrinsically variable. Further complexity arises as the cigarette is converted to cigarette smoke during smoking.

The quantitative measurement of nicotine, of particulate matter and of nicotine-free dry particulate matter (NFDPM, sometimes referred to as "tar") is therefore dependent on the arbitrary definition of the means used to generate and collect the smoke. In particular, the ambient conditions (e.g. temperature, humidity, air movement within the laboratory) under which the test pieces are conditioned and smoke is collected play a critical role in the accuracy of the measurement.

Sidestream smoke in this International Standard is understood to be the smoke that is evolved from the cigarette during the smoking run other than from the mouth end (which is called mainstream smoke).

NOTE Sidestream smoke is distinguished from environmental tobacco smoke (ETS), which is a mixture of aged and diluted exhaled mainstream smoke and aged and diluted sidestream smoke, and for the assessment of which the present method does not apply.

From the time that scientists first attempted to determine nicotine and total and dry particulate matter yields in sidestream smoke, many different methods have been adopted. However, experience has shown some procedures to be more reliable and more amenable to handling of large numbers of samples. With these factors in mind, during the 1999–2002 period, collaborative studies by a task force composed of CORESTA (www.coresta.org) members have shown that improvements in repeatability and reproducibility result when some restrictions are placed upon the wide variety of methods and practices described in existing methods.

This International Standard, produced after much collaborative experimentation by many laboratories in many countries, reflects the results of the optimization proposed and validated by the task force and provides one set of procedures that are the accepted reference procedures and for which repeatability and reproducibility of the determinations were assessed. Experience in the task force has shown how strict adherence to the detailed set up and conditions of the method, as well as the degree of proficiency of the operator, affect the precision of the results.

Further, it is preferable that the selected method be compatible with different modes of cigarette equilibration or puffing parameters for the smoking of the tested pieces. The ISO standards for the determination of mainstream smoke yields were, however, followed to the largest possible extent, although the machines used by the different laboratories were all of a linear type.

This method is a machine method and it allows cigarettes to be smoked using a strictly controlled set of parameters. Thus it enables the sidestream smoke NFDPM and nicotine from cigarettes, when smoked by this procedure, to be compared and ranked. In the course of its studies, the task force demonstrated the value of comparing the analytical processes and their stability by use of the CORESTA monitor test piece for determining NFDPM and nicotine yields.

Since the determinations of NFDPM and nicotine in sidestream smoke are by nature more complex and delicate than their counterparts performed on mainstream smoke, it is highly recommended to include a monitor test piece in the smoking plans, as is done in mainstream smoke determinations. It is possible to use the CORESTA monitor or any other internally designed monitor test piece for this purpose. The use of an internationally recognized one is recommended.