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Water pipe tobacco smoking machine — Definitions and standard conditions

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Foreword

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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).

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

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Introduction

In the early 21st century, the habit of water pipe smoking has spread worldwide especially among young people. Formerly smoked mainly in Asia and Northern Africa, water pipe smoking has now spread in European countries and the US. In this light, it is necessary to set up an International Standard for the machine smoking of water pipe tobacco. Certain requirements, which are addressed in this document, are based on experience and knowledge gained from the use of analytical water pipe tobacco smoking machines. This is intended to lead to a better understanding of the products used and contribute to better consumer information.

Although charcoal is typically used for water pipe smoking in the method described in this document, the water pipe tobacco is heated by means of an electrical heater. This was decided in order to eliminate the unpredictable influence of different types of charcoal on the measurement result. Nevertheless, there is a general need to include this important aspect in a seperate method, for example, in view of the determination of CO.

No machine smoking regime can represent all human smoking behaviour.

— Machine smoking testing is useful to characterize water pipe tobacco emissions for design and regulatory purposes, but communication of machine measurements to smokers can result in misunderstandings about differences in exposure and risk across brands.

— Smoke emission data from machine measurements may be used as inputs for product hazard assessment, but they are not intended to be nor are they valid as measures of human exposure or risks. Communicating differences between products in machine measurements as differences in exposure or risk is a misuse of testing using ISO standards.

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Water pipe tobacco smoking machine — Definitions and standard conditions

1 Scope

This document

— defines smoking parameters and specifies the standard conditions to be provided for the routine analytical machine smoking of water pipe tobacco, where the water pipe tobacco sample is electrically heated only and not combusted;

— specifies the requirements for a routine analytical smoking machine complying with the standard conditions.

This document is only applicable for water pipe tobacco used in devices known as “arghile”, “hookah”, “nargile” or “shisha” in which tobacco is heated, not combusted. Other types of water pipe tobacco that are used in other devices such as “Chinese water pipe” are not covered.

2 Normative references

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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.

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

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ISO 4796-2, *Laboratory glassware — Bottles — Part 2: Conical neck bottles*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
test atmosphere
atmosphere to which a sample or test piece is exposed throughout the test

Note 1 to entry: It is characterized by specified values for one or more of the following parameters: temperature, relative humidity and pressure, which are kept within the specified tolerances.

Note 2 to entry: The test may be carried out either in the laboratory or in a special chamber termed the “test chamber”, or in the conditioning chamber, the choice depending on the nature of the test piece and on the test itself. For example, close control of the test atmosphere may not be necessary if the change in properties of the test piece is insignificant over the test period.

[SOURCE: ISO 3402:1999, 2.3, modified — Note 3 to entry has been omitted.]

3.2
restricted smoking
condition that exists when the connection tube of a water pipe is closed to the atmosphere between successive puffs

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3.3
pressure drop
static pressure difference between the two ends of 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 nominally 204 ml/s

Note 1 to entry: The pressure drop has to be determined with the required amount of water filled in the bottle and the *smoke trap* (3.13) connected.

3.4
puff duration
interval of time during which the flow path of a water pipe is pneumatically connected to the suction mechanism

3.5
puff volume
volume leaving the water pipe and passing through the *smoke trap* (3.13) for a single *puff duration* (3.4)

Note 1 to entry: The volume flow is determined with the water pipe connected.

3.6
puff number
number of puffs necessary to smoke a sample of water pipe tobacco

3.7
puff frequency
number of puffs in a given time

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3.8
puff termination
termination of the connection of the water pipe to the suction mechanism

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3.9
puff profile
flow rate measured at the inlet of the *smoke trap* (3.13) connected to the suction source and depicted graphically as a function of time

3.10
dead volume
volume of air which exists between the *head* (3.12) of a water pipe and the suction mechanism

3.11
water pipe tobacco holder
device for holding the water pipe tobacco during smoking

3.12
head
device holding the *water pipe tobacco holder* (3.11) and connecting it to the suction tube

3.13
smoke trap
device for collecting such part of the smoke from a sample of water pipe tobacco as is necessary for the determination of specified smoke components

3.14
port
aperture of the suction mechanism through which a puff is drawn and to which is attached a *smoke trap* (3.13)

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3.15
compensation
ability to maintain constant *puff volumes* (3.5) and *puff profiles* (3.9) when the *pressure drop* (3.3) at the *port* (3.14) changes

3.16
mainstream smoke
smoke which leaves the mouth end of the water pipe during the smoking process

3.17
sidestream smoke
all smoke which leaves a *head* (3.12) of a water pipe during the smoking process other than from the head end connected to suction tube

3.18
plate
device positioned under the water pipe *head* (3.12) to collect falling particles from the water pipe tobacco during smoking

3.19
wind shield
cylindrical device to protect the water pipe tobacco *head* (3.12) and holder against *ambient air flow* (3.21) during smoking

3.20
clearing puff
puff taken after the water pipe tobacco has been removed from the *water pipe tobacco holder* (3.11)

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3.21
ambient air flow
air flow around the water pipe *head* (3.12) and holder during the smoking process

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4 Standard conditions

4.1 Machine pressure drop

The whole of the flow path between the head of the water pipe and the suction mechanism shall offer the least possible resistance, and its pressure drop shall not exceed 1 500 Pa.

4.2 Puff duration

The standard puff duration shall be 2,6 s ± 0,1 s.

4.3 Puff volume

The standard puff volume shall be 530 ml ± 10 ml.

4.4 Puff frequency

The standard puff frequency shall be 3 puffs per minute with one puff starting every 20 s ± 0,5 s measured over 10 consecutive puffs.

4.5 Puff profile

The puff profile shall be of rectangular shape, measured at the inlet of the puff generator with a pressure drop of 1 500 Pa ± 50 Pa. The volume V_1 plus V_3 of the increasing and decreasing parts of the profile shall not exceed 10 % of the total puff volume $V_1 + V_2 + V_3$. The flow rate between t_1 and t_2 shall be 215 ml/s ± 25 ml/s in average (see Figure 1).

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