
**Vapour products — Routine analytical
vaping machine — Definitions and
standard conditions**

*Produits de vapotage — Machine à vapoter pour analyses de contrôle
— Définitions et conditions normalisées*

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Published in Switzerland

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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).

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).

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.

This document was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 3, *Vape and vapour products*. ISO 20768:2018

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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.

Introduction

Vapour products are devices intended for human use, most of which contain electronic components which vaporize a liquid to generate an aerosol carried by the air drawn through the device by the user. The devices are designed either as a single piece or as modular, multiple component products, for disposable, rechargeable and/or refillable use. In some cases, proprietary cartridges, pre-filled with liquid, are replaced. Their use, often described as vaping, has grown substantially in recent years and there are now regulations in place in a number of national and international jurisdictions requiring the measurement of constituents of the aerosol produced by the devices.

This document has been developed to define and specify the requirements of machines used in laboratories to draw air through the devices in order to generate aerosol for subsequent analytical testing in a robust and reproducible manner.

There is a very wide range of vapour products available to consumers and limited reliable data describing how they are used. The available data demonstrates significant intra- and inter-consumer variation in behaviour. Consequently, no machine vaping regime can represent all human vaping behaviour. As reliable data describing human vaping behaviour become available it may be appropriate to test devices differently according to their design, or under conditions of different intensity to reflect the range of human behaviour.

Machine testing is useful to characterize emissions for device development and regulatory purposes, and may be used as inputs for product hazard assessment; however, it is not intended to be nor is it valid as a measure of human exposure or risk. Communication of machine measurements to consumers can result in misunderstandings about differences in exposure and risk across devices.

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Vapour products — Routine analytical vaping machine — Definitions and standard conditions

1 Scope

This document:

- defines the parameters and specifies the standard conditions for a vaping machine for vapour products (as defined in [3.1](#));
- specifies technical requirements for the machine for routine analytical vaping, conforming with the standard conditions stated within [Clause 4](#);
- does not specify the vapour product, the vapour product operation or the liquid to be used;
- does not specify the means for aerosol trapping, subsequent sample preparation or analyses of components in the trapped aerosol.

2 Normative references

There are no normative references in this document.

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

vapour product

device intended for human use, which normally contains electronic components that vaporize a liquid to generate an aerosol carried by the air drawn through the device by the user

Note 1 to entry: This document covers products following the above definition. This includes products described as electronic nicotine delivery systems (ENDS), e-cigarettes, e-cigars, e-shisha, e-pipes and other related product categories. These products could be designed either as single pieces or as modular, multiple component products for disposable, rechargeable and/or refillable use. In some cases, proprietary cartridges, pre-filled with liquid, are replaced.

3.2

puff activation

function necessary to start the aerosol generation process in the product under test, which should be synchronized to the start of the puff duration

3.3

puff volume

volume drawn by the machine at the mouth end of the vapour product

3.4

puff duration

interval of time, measured in seconds, during which the port of the machine is pneumatically connected to the suction mechanism

3.5

puff period

time between the start of one puff and the start of the subsequent puff

3.6

puff number

number of puffs applied to the vapour product

3.7

puff termination

termination of the connection of the vapour product to the suction mechanism

3.8

puff profile

flow rate measured over the time span of the puff at the port of the machine, typically depicted graphically as a function of time

3.9

clearing puff

puff taken immediately after the sample has been removed from the port of the machine

3.10

vapour product holder

device for connecting the vapour product to the port of the machine during aerosol generation and collection

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3.11

aerosol stream

aerosol which leaves the mouth-end of the vapour product during aerosol generation

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3.12

aerosol trap

device for collecting the aerosol from vapour products which is necessary for the determination of specified analytes

3.13

port

aperture of the suction mechanism through which a puff is drawn and to which is attached an aerosol trap

3.14

activation time

pre-heating time

variable time period supported by the vaping machine and programmable by the operator according to the requirements of the product under test

3.15

termination of aerosol generation

point at which an activated product under test ceases to produce detectable quantities of aerosol for any reason (e.g. product failure, discharged battery, exhausted liquid reservoir)

3.16**pressure drop**

static pressure difference between the two ends of a pneumatic circuit when it is traversed by an air flow under steady conditions as described in ISO 7210

Note 1 to entry: Although the pressure drop of a device or a pneumatic circuit is defined for a specific set of reference parameters to describe its physical properties, the device could be used for measurements under conditions other than the reference parameters.

3.17**test atmosphere**

atmosphere to which a vapour product is exposed throughout the test

3.18**compensation**

ability to maintain constant puff volumes and puff profiles when the pressure drop at the port changes

Note 1 to entry: In practice a change of the pressure drop is introduced by the connection of the test product to the machine or the inclusion of an aerosol trap.

4 Standard conditions**4.1 Puff volume**

The standard puff volume shall be $55 \text{ ml} \pm 0,6 \text{ ml}$ determined at the port of the vaping machine in series with a pressure drop device of $1\,000 \text{ Pa} \pm 50 \text{ Pa}$.

4.2 Puff duration

The standard puff duration shall be $3 \text{ s} \pm 0,1 \text{ s}$.

4.3 Puff period

The standard puff period shall be one puff starting every $30 \text{ s} \pm 0,5 \text{ s}$.

4.4 Puff number

Each individual puff shall be counted and recorded until the collection process is terminated. The machine shall be capable of taking a predetermined number of puffs or allowing operator termination.

4.5 Puff profile

The puff profile shall be of approximate rectangular shape, measured at the port of the machine with a pressure drop device of $1\,000 \text{ Pa} \pm 50 \text{ Pa}$. 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 maximum flow rate shall be $18,3 \text{ ml/s} \pm 1,8 \text{ ml/s}$ (see [Figure 1](#)).