SLOVENSKI STANDARD
oSIST prEN ISO 24199:2021

01-september-2021

Hlapni proizvodi - Ugotavljanje deleža nikotina v emisijah hlapnih proizvodov - Metoda plinske kromatografije (ISO/DIS 24199:2021)

Vapour products - Determination of nicotine in vapour product emissions - Gas chromatographic method (ISO/DIS 24199:2021)

Dampfprodukte - Bestimmung von Nikotin in Emissionen von Dampfprodukten - Gaschromatographisches Verfahren (ISO/DIS 24199:2021)

Produits de vapotage - Détermination de la teneur en nicotine dans les émissions de produits de vapotage - Méthode par chromatographie en phase gazeuse (ISO/DIS 24199:2021)

Ta slovenski standard je istoveten z: **prEN ISO 24199**

ICS:

65.160	Tobak, tobačni izdelki in oprema	Tobacco, tobacco products and related equipment
71.040.50	Fizikalnokemijske analitske metode	Physicochemical methods of analysis

oSIST prEN ISO 24199:2021 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 24199

ISO/TC **126**/SC **3** Secretariat: **AFNOR**

Voting begins on: **2021-07-05**

Voting terminates on: **2021-09-27**

Vapour products — Determination of nicotine in vapour product emissions — Gas chromatographic method

ICS: 65.160

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 24199:2021(E)

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Published in Switzerland

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Foreword

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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*.

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

In many countries regulation of vapour products require reporting for nicotine compounds in emissions. Therefore, there is a necessity to have an International Standard in place to get reliable/ comparable data on nicotine in electronic cigarette emissions.

The method in this document is based upon the CORESTA recommended method (CRM) 84[9], which was written on the basis of the results obtained in an interlaboratory study conducted in 2015 involving 18 laboratories[12] and an interlaboratory study conducted in 2019 involving 11 laboratories[13].

This document has been developed to describe the procedures used to measure the amount of nicotine in the aerosol from vapour products utilizing gas chromatography coupled with a flame ionization detector. The experimental designing parameters[10][11] used to collect the aerosolised vapour should be evaluated and documented for each analysis.

Vapour products — Determination of nicotine in vapour product emissions — Gas chromatographic method

1 Scope

This document specifies an analytical method to quantify nicotine of collected vapour product emissions by gas chromatography.

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 20768, *Vapour products — Routine analytical vaping machine — Definitions and standard conditions*

ISO 24197, *Vapour products — Determination of e-liquids vaporised mass and aerosol collected mass*

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 https://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

[SOURCE: ISO 20768:2018, 3.1, modified – Note 1 to entry has been removed]

3.2
e-liquid
liquid or gel consumable which may or may not contain nicotine intended for transformation into an aerosol and then inhaled with an electronic nicotine delivery device

[SOURCE: ISO 20714:2019, 3.1 modified – Reference to subsequent definition of electronic nicotine delivery device has been removed]

3.3
aerosol collected mass
ACM
mass of aerosol collected on a glass fibre filter pad resulting from the operation of a vapour product by a routine analytical vaping machine after a defined number of puffs

Note 1 to entry: Routine analytical vaping machine is covered by ISO 20768.

3.4
puff block
finite series of sequential puffs as defined by the user or by the test request

EXAMPLE Puff block 1: puffs 1 to 50, puff block 2: puffs 51 to 100, puff block 3: puffs 101 to 150.

4 Principle

The vapour product emissions are generated and collected as described in ISO 20768. The aerosol collected mass is determined gravimetrically. The collected matter is then extracted with isopropanol solution containing internal standard(s). The nicotine content of an aliquot of the solution is determined by capillary gas chromatography with flame ionization detection (GC-FID), and quantitated by internal standard calibration. The nicotine content in the vapour product emissions is calculated. Results are expressed as the weight of nicotine per puff, per aerosol collect mass (ACM), or per puff block as warranted.

5 Reagents

Use only reagents of recognized analytical grade.

5.1 Carrier gas: helium (CAS 7440-59-7), nitrogen (CAS 7727-37-9), or hydrogen (CAS 1333-74-0) of high purity.

5.2 Auxiliary gases: air and hydrogen (CAS 1333-74-0) of high purity for the flame ionization detector.

5.3 Isopropanol (CAS 67-63-0), minimum purity 99 %, used with internal standard(s) to prepare the extraction solution.

5.4 Internal standards of high purity: quinaldine(CAS 91-63-4) or n-heptadecane (CAS 629-78-7) of purity not less than 99 %.

n-octadecane (CAS 593-45-3) or other appropriate internal standards may be used after assessment of their purity and determination that the internal standard does not co-elute with other components in the sample extract. The peak area of the internal standard on samples should be monitored for consistency. In cases where inconsistencies are found, analysis of a prepared sample solution without the internal standard should be performed to confirm the absence of a peak in the extract eluting at the same time as the internal standard.

5.5 Extraction solution: isopropanol (5.3) containing an appropriate concentration of the internal standard (5.4), this is normally in the range of 0,1 mg/ml to 1,0 mg/ml.

5.6 Reference substance: nicotine (CAS 54-11-5), of known purity not less than 98 %. Nicotine salicylate (CAS: 29790-52-1) of known purity not less than 98 % may also be used. Store the reference substance at a temperature in accordance with the manufacturer's recommendation.

The purity of the nicotine or nicotine salicylate may be verified in accordance with ISO 13276 or by any other validated method.

5.7 Calibration solutions.

Prepare a series of at least five calibration solutions with concentrations that cover the range of expected levels to be found in the test portion by adding weighed amounts of nicotine (5.6) to the extract solution. The suggested concentration range is 0,05 mg/ml ~ 2,0 mg/ml.

Store these solutions between 2 °C and 8 °C and exclude light.

