Cooperation Centre for Scientific Research Relative to Tobacco

Heated Tobacco Products Task Force

CORESTA Recommended Method No. 101

DEFINITIONS AND STANDARD CONDITIONS: AEROSOL GENERATION AND COLLECTION FOR ELECTRICALLY HEATED TOBACCO PRODUCTS

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DEFINITIONS AND STANDARD CONDITIONS: AEROSOL GENERATION AND COLLECTION FOR ELECTRICALLY HEATED TOBACCO PRODUCTS

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1. INTRODUCTION

This method includes the requirements found necessary for the generation and collection of aerosol from electrically heated tobacco products (eHTP) for analytical testing purposes. This method is based on the findings reported in the CORESTA Heated Tobacco Products (HTP) Task Force Technical Report, 2020: Heated Tobacco Products (HTPs): Standardized Terminology and Recommendations for the Generation and Collection of Emissions[1].

2. FIELD OF APPLICATION

This method: - defines the parameters and specifies the standard conditions for the routine analytical generation and collection of aerosol from eHTPs; - specifies technical requirements for the routine analytical vaping machine for eHTP generation and collection, termed as "machine" in this document, complying with the standard conditions stated within; - does not specify aerosol trapping nor subsequent sample preparation and analytical methods for analyses of components in the trapped aerosol or the gas phase; - may also be used for products other than defined in 4.15 if a specific testing requirement references this method.

3. NORMATIVE REFERENCES

3.1 ISO 20778: *Cigarettes — Routine analytical cigarette smoking machine — Definitions and standard conditions with an intense smoking regime*

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

3.3 ISO 3308*: Routine analytical cigarette-smoking machine — Definitions and standard conditions*

4. TERMS AND DEFINITIONS

For the purposes of this recommended method the following terms and definitions apply.

4.1 Conditioning atmosphere

Atmosphere in which the electrically Heated Tobacco Products (eHTPs) are kept before being subjected to test.

4.2 Test atmosphere

Atmosphere to which the Tobacco Heating System (THS) is exposed throughout the test volume leaving the eHTP and passing through the aerosol trap.

4.3 Puff number

Number of puffs collected from an eHTP.

4.4 Puff termination

Termination of the connection of the eHTP to the suction mechanism.

4.5 Sample holder

Device for connecting the eHTP to the port of the machine during aerosol generation and collection.

4.6 Electrically Heated Tobacco Product (eHTP)

A product containing a tobacco substrate that is heated with an electrical Tobacco Heating Device (THD) without combustion of the tobacco substrate in order to produce a nicotine containing aerosol.

4.7 Tobacco substrate

Material (substrate) that contains processed tobacco and may contain aerosol generation agents, flavourings, and other ingredients.

4.8 Tobacco Heating Device (THD)

Device providing the source(s) of heat required to directly or indirectly heat a heated tobacco product (HTP) without combustion of the heated tobacco substrate.

4.9 Tobacco Heating System (THS)

Specific combination of a HTP and a THD which, based on information made available to the consumer by the manufacturer, shall be used together to produce a nicotine-containing aerosol without combustion of the tobacco substrate.

5. STANDARD CONDITIONS

5.1 General

Standard conditions detailed in clauses 4.1 – 4.5 of ISO 20778: 2018 shall be followed with the substitution of the phrase “mouth end of the eHTP” in place of “butt end of the cigarette”.

5.2 Puff number (see 4.3)

Each individual puff shall be counted and recorded until the collection process is terminated. Please refer to 7.5 and 7.6 for initiation and termination of puffing.

6. SPECIFICATION OF THE SUCTION SOURCE

6.1 General

The machine shall comply with clauses 5.1 – 5.4.7 of ISO 20778: 2018 with the following substitutions:

Replace “smoking machine” with “machine”

Replace “cigarette” with “sample”

Replace “butt of the cigarette” with “mouth end of the eHTP”

Replace “cigarette holders” with “sample holders”

Replace “smoke” with “aerosol”

7. SAMPLE PREPARATION AND TESTING

7.1 Sample conditioning and handling

The eHTPs must be temperature equilibrated in sealed packs for a minimum of 48 hours and a maximum of 10 days at an ambient temperature of (22 ± 1) °C. Samples should be removed from the pack immediately prior to testing, in order to avoid absorption of environmental moisture by the tobacco substrate which may influence aerosol yields. Samples removed from open packs may be kept in sealed containers for a maximum of 4 hours; after this time they should no longer be regarded as suitable for testing and must be discarded. This period may be extended if the testing laboratory is able to demonstrate that there is no influence on yields.

7.2 THD preparation

Battery state of charge and contamination of heating surfaces may influence aerosol generation and composition. Therefore, THDs should be fully charged and cleaned according to manufacturer’s instructions prior to commencement of testing.

7.3 Vent blocking

Vent blocking should be applied to eHTPs only if (a) ventilation holes in the product ‘filter’ section can be occluded in normal use and (b) vent blocking does not compromise the operation of the THD (for example, air inlet holes in the THD are not ‘vents’ and must not be occluded in testing).

Where blocking of the filter ventilation holes is required, this may be accomplished by two approaches:

7.3.1 A modified sample holder which fully occludes the ventilation holes.

7.3.2 The ventilation holes are sealed with tape: a 10 mm to 20 mm wide cellophane tape shall be applied (manually or with an over-tipping machine) around the entire circumference of the eHTP, with the end of the tape not extending beyond the mouth end or to any part of the eHTP which would enter the heating section of the THD. If the position of the ventilation holes is not known, it shall be verified that the tape covers them. No wrinkles or air holes shall appear. The tape shall circle the eHTP once with a small overlap.

7.4 Test atmosphere

The test atmosphere must be controlled as described in ISO 3402, summarised as follows:

— Temperature: (22 ± 2) °C;

— Relative Humidity: (60 ± 5) %.

For additional considerations/parameters refer to ISO 3402.

7.5 Initiation of collection

The THD should be activated and allowed to complete its preheating cycle. When completion of the preheating cycle is indicated as described in manufacturer's user instructions (e.g. LED indication, haptic feedback), puffing and aerosol collection should be initiated, synchronised to this indication.

7.6 Termination of collection

THDs available at the time of publication have a defined heating duration or puff count and completion of the heating cycle is indicated by LEDs and/or vibration. If user-indicated completion of the heating cycle occurs at the same time as a puff is taken, puffing and collection should be terminated after this puff. If completion of the heating cycle is not synchronised with a puff being taken, one further puff should be taken prior to termination.

7.7 THD error or malfunction

Samples must be kept under observation for the duration of the test run. If a THD indicates an error or ceases to operate during the test, the results will be deemed invalid.

8. REPEATABILITY AND REPRODUCIBILITY

An international proficiency study involving 17 laboratories which followed this CORESTA Recommended Method up to the point of aerosol collection and determination of aerosol collected mass (ACM) was conducted by the CORESTA HTP Task Force in 2021 [2]. Results were analyzed in basic conformance with ISO 5725-2:1994 and ISO 13528. The mean ACM values and the repeatability (r) and reproducibility (R) values are given in Table 1.

Table 1. Estimates of test sample mean, standard deviations and repeatability and reproducibility for Aerosol Collected Mass (ACM).

Product	N° of Labs	Mean mg/consumable	r	% r	R	% R	rSD (σ_r)	RSD (σ_R)
Sample A	16	45.26	5.148	11.4	19.08	42.2	1.839	6.814
Sample B	13	27.73	4.449	12.4	13.62	49.1	1.232	4.863

9. BIBLIOGRAPHY

[1] CORESTA Heated Tobacco Products Task Force Technical Report: Heated Tobacco Products (HTPs): Standardized Terminology and Recommendations for the Generation and Collection of Emissions. [HTP-259-CTR]

[2] CORESTA Heated Tobacco Products Task Force Technical Report – Proficiency Study for Propylene Glycol, Glycerin, Nicotine, CO, NO, NOx, ACM, and DML in HTP Aerosol. [HTP-280-CTR]