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Certificate of Analysis

1R6F Certified Reference Cigarette

Certificate Number: 2017-002CTRP
Certification Date: 08/24/2017
Validity: This document is valid until 08/24/2022 unless superseded by a new CoA at an earlier date.
This document supersedes CoA 2016-002CTRP

Description of CRM	Blended Cigarette, unflavored, 83 mm length
Lot/Batch Number	**1R6F**
Matrix	Tobacco blend
Major starting materials	Flue-cured, burley and Oriental tobacco types, reconstituted tobacco sheets, expanded flue-cured, expanded burley, glycerin, Isosweet (sugar), propylene glycol

1R6F Reference Cigarette Certified Values and Uncertainties

International Organization for Standardization (ISO) Smoking Regime

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Within-laboratory Uncertainty ($U_{CRM,L}$)	Unit	Number of accepted data points
Total Particulate Matter (TPM)	9.99	0.68	0.57	mg/cigarette	1080
Tar (Nicotine-free dry particulate matter)	8.58	0.55	0.50	mg/cigarette	1080
CO (Carbon monoxide)	10.1	0.7	0.5	mg/cigarette	1080
Nicotine	0.721	0.067	0.028	mg/cigarette	1080
Puff count	7.53	0.41	0.23	Puff/cigarette	1080
Acetaldehyde	522	63	47	µg/cigarette	207
Acrolein	43	10	6	µg/cigarette	207
Acrylonitrile	7.0	1.4	0.5	µg/cigarette	207
4-Aminobiphenyl	1.2	0.3	0.1	ng/cigarette	207
1-Aminonaphthalene	14	5	1	ng/cigarette	207
2-Aminonaphthalene	8	3	1	ng/cigarette	207
Ammonia	9.0	2.6	1.2	µg/cigarette	207
Benzene	33	4	1	µg/cigarette	207
Benzo[α]pyrene	6.8	1.3	1.0	ng/cigarette	207
1,3-Butadiene	38	4	3	µg/cigarette	207
Crotonaldehyde	11	2	2	µg/cigarette	207
Formaldehyde	27	7	3	µg/cigarette	207
Isoprene	320	55	17	µg/cigarette	207
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	71	10	5	ng/cigarette	207
NNN (*N*-nitrosonornicotine)	85	6	5	ng/cigarette	207
Toluene	53	7	3	µg/cigarette	207

Health Canada Intense (HCI) Smoking Regime

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Within-laboratory Uncertainty ($U_{CRM,L}$)	Unit	Number of accepted data points
Total Particulate Matter (TPM)	46.8	2.9	1.9	mg/cigarette	207
Tar (Nicotine-free dry particulate matter)	29.1	1.7	1.1	mg/cigarette	207

CO (Carbon monoxide)	28.0	1.8	0.9	mg/cigarette	207
Nicotine	1.896	0.101	0.063	mg/cigarette	207
Puff count	8.69	0.34	0.24	Puff/cigarette	207
Acetaldehyde	1552	138	57	µg/cigarette	207
Acrolein	154	19	7	µg/cigarette	207
Acrylonitrile	24	5	1	µg/cigarette	207
4-Aminobiphenyl	2.3	0.6	0.2	ng/cigarette	207
1-Aminonaphthalene	24	8	3	ng/cigarette	207
2-Aminonaphthalene	14	5	2	ng/cigarette	207
Ammonia	30	4	2	µg/cigarette	207
Benzene	88	8	4	µg/cigarette	207
Benzo[α]pyrene	15	2	1	ng/cigarette	207
1,3-Butadiene	103	8	5	µg/cigarette	207
Crotonaldehyde	51	7	2	µg/cigarette	207
Formaldehyde	104	19	6	µg/cigarette	207
Isoprene	881	151	36	µg/cigarette	207
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	187	26	8	ng/cigarette	207
NNN (*N*-nitrosonornicotine)	212	31	15	ng/cigarette	207
Toluene	150	18	5	µg/cigarette	207

Tobacco Filler

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Within-laboratory Uncertainty ($U_{CRM,L}$)	Unit	Number of accepted data points
Ammonia	956	180	23	µg/g	207
Arsenic	247	43	24	ng/g	182
Cadmium	939	94	32	ng/g	206
Total nicotine	17978	741	642	µg/g	207
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	676	208	62	ng/g	207
NNN (*N*-nitrosonornicotine)	2131	287	129	ng/g	207

Physical Attributes

Parameter	Certified Value	Certified Uncertainty (U_{CRM})	Within-laboratory Uncertainty ($U_{CRM,L}$)	Unit	Number of accepted data points
Cigarette circumference	24.6	0.5	0.2	mm	1810
Resistance to draw	107	4	4	mm H_2O	1810
Cigarette length	83.0	0.1	0.1	mm	1810
Cigarette mass	0.89	0.01	0.01	g/cigarette	1809
Filter pressure drop	137	3	3	mm H_2O	1810
Total ventilation	33	5	3	%	1810
Air permeability (cigarette paper)	45	5	5	$cm^3(min^{-1}.cm^{-2})$ at 1 kPa	1110
Tobacco filler mass	625	16	15	mg/cigarette	1810
Nominal diameter	7.83	0.16	0.05	mm	1370
Filter length	27.0	0.1	0.1	mm	1370
Tobacco filler moisture content	11.27	1.89	0.27	%	207
Tobacco filler pH	5.45	0.15	0.03	pH units	207
Apparent Filter density	0.123	0.004	0.003	g/cm^3	1140
Tobacco rod length	56.0	0.1	0.1	mm	1370

CERTIFIED VALUES AND UNCERTAINTIES:

The "Certified Values" listed above are unweighted means of results submitted by three ISO 17025-accredited laboratories using a combination of methods and instrumentation that emulate actual methods and instrumentation techniques currently utilized in the analysis of each parameter in the analytical community. No assumptions were made regarding the accuracy or precision of each laboratory therefore no weighting was done on the results of each lab.

The "Certified Uncertainties", U_{CRM}, listed above are expanded uncertainties intended to provide confidence intervals of approximately 95% around the respective reference values obtained by multiplying the combined standard uncertainty with a coverage factor of 2, i.e. ***k = 2.*** Each "Certified Uncertainty" includes an uncertainty component that accounts for systematic effects among the methods used by different laboratories.

The "Within-laboratory Uncertainties", $U_{CRM,L}$, listed above are expanded uncertainties signifying the level of uncertainty that can be expected for a single lab relative to its own results. The "Within-laboratory Uncertainties" *do not include* uncertainty components that account for systematic effects relative to the "Certified Values". Each "Within-laboratory Uncertainty" is intended to provide a confidence interval of approximately 95% around the respective *reference values generated by each lab* and mostly reflects the homogeneity of the 1R6F. This uncertainty is obtained by multiplying the standard uncertainty with a coverage factor of 2, i.e. ***k = 2,*** without accounting for between-lab/between-method uncertainty.

The Certified Values and Uncertainties for ISO and HCI smoke parameters contained herein are reflective only of data obtained from a Linear Smoking machine.

STATEMENT OF TRACEABILITY:
The traceability of the reference values and uncertainties certified herein are maintained through an unbroken chain of comparisons to appropriate standards with suitable procedures and measurement uncertainties by virtue of the ISO 17025-accreditations possessed by the three participating laboratories. The accredited analytical methods used by participating laboratories are listed below.

LIST OF METHODS USED:

Smoking Regimes, Smoke Parameters and Physical Attributes	**Inclusive Validated Analytical Methods**
ISO smoking regime: Total Particulate Matter (TPM), Puff count – ISO 3308	EQU-037/T-115/ENT 508
HCI smoking regime, Total Particulate Matter (TPM), Puff count	EQU-037/T-115/ENT 508
Tar (Nicotine-free dry particulate matter) – ISO 4387/ ISO 3308/ ISO 4387	AM-008/T-115/ENT 181
Nicotine Mainstream smoke – ISO 10315	AM-001/T-115/ENT 181
Carbon Monoxide in Mainstream smoke – ISO 8454	AM-007/T-115/ENT 508
Ammonia in Mainstream smoke	AM-011/T-101/ENT 304
Volatiles in Mainstream smoke	AM-015/TMS-00124/ENT 208
Tobacco Specific Nitrosamines (TSNAs) in Mainstream Smoke	AM-020/TMS-00135/ENT 211
Tobacco Specific Nitrosamines (TSNAs) in Tobacco	AM-031/TWT-00333/ENT 210
Polycyclic Aromatic Hydrocarbons (PAHs) in Mainstream Smoke and Sidestream Smoke by GC/MS	AM-044/T-103/ENT 204
Selected Metals in Tobacco	AM-052/T-306
pH of Tobacco by pH Meter/ Moisture and pH For Smokeless Tobacco Products [CDC Version] – FR Vol. 74, No. 4 January 7, 2009/ AOAC 966.02	AM-053 & AM-071/T-130/ENT 046
Carbonyls in Mainstream smoke	AM-076/T-104/ENT 302
Selected Alkaloids in Tobacco (Nicotine)	AM-100/T-301/ENT 182
Ammonia in Tobacco	AM-115/T-302/ENT 332
Polycyclic Aromatic Amines (PAAs) in Mainstream smoke	AM-199/T-102/ENT 213
Air permeability – ISO 2965	AM-057
Physical Properties – ISO 2971, ISO 6565, ISO 9512	AM-009 / ENT 506

INTENDED USE: This product may be used for analytical method development, assigning values to materials (when applicable), and, equipment calibration to any applicable extent.

INSTRUCTIONS FOR CORRECT USE: This reference material may be stored at room temperature for a maximum of 10 days prior to conditioning. If this reference material is to be kept for 10 days to 3 months, store in the original packaging or in airtight containers just large enough to contain the sample in a cool dry place (~4°C). If it is to be kept for longer than 3 months, it is recommended that the reference material be stored frozen at, or below, –16 °C until needed. Conditioning of this material should be done following ISO 3402-1:1999. Smoke the reference cigarettes following ISO 3308:2012 "standard" (for the ISO smoking regime) or "Canadian modified" (for the HCI smoking regime). Any cigarettes found to have obvious defects, or which have been damaged during insertion, shall be discarded and replaced with spare, conditioned cigarettes.

HAZARD INFORMATION: N/A

HOMOGENEITY: Homogeneity of this material is reflected in the "Within-laboratory Uncertainty" as indicated in this Certificate of Analysis.

NAMES AND SIGNATURES OF CERTIFYING OFFICERS:

Certificate Approved by:
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