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Center for Tobacco Reference Products

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Certificate of Analysis

1R6F Certified Reference Cigarette

Certificate Number: 2016-002CTRP
Certification Date: 08/24/2016
Valid until: 08/24/2017
Superseded CoA: 2016-001CTRP

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

Interpretation of Data

1. Certified values listed below reflect analysis results submitted by three (3) 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.
2. The "Certified Uncertainty" listed herein are expanded uncertainties intended to provide a 95% confidence interval around the respective reference values obtained by multiplying the combined standard uncertainty by an appropriate coverage factor, ***k***, based on a ***t***-factor obtained from the ***t***-distribution where the effective degrees of freedom, (ν_{eff}), is derived from the Welch-Satterthwaite formula.
3. The Certified Values and Uncertainties for ISO and HCI smoke parameters contained herein are reflective only of data obtained from a Linear Smoking machine.

1R6F Reference Cigarette Certified Values and Uncertainties

International Organization for Standardization (ISO) Smoking Regime					
Parameter	**Certified Value**	**Certified Uncertainty**	**Unit**	**Number of accepted data points**	**Coverage factor based on *t*-factor**
Total Particulate Matter (TPM)	9.99	0.69	mg/cigarette	1080	2.09
Tar (Nicotine-free dry particulate matter)	8.58	0.53	mg/cigarette	1080	2.02
CO (Carbon monoxide)	10.1	0.8	mg/cigarette	1080	2.26
Nicotine	0.721	0.107	mg/cigarette	1080	3.27
Puff count	7.53	0.56	Puff/cigarette	1080	2.76
Acetaldehyde	522	69	µg/cigarette	207	2.27
Acrolein	43	14	µg/cigarette	207	3.16
Acrylonitrile	7.0	2.5	µg/cigarette	207	3.61
4-Aminobiphenyl	1.2	0.4	ng/cigarette	207	3.23
1-Aminonaphthalene	14	9	ng/cigarette	207	4.04
2-Aminonaphthalene	8	5	ng/cigarette	207	3.37
Ammonia	9.0	4.2	µg/cigarette	207	3.30
Benzene	33	8	µg/cigarette	207	3.85
Benzo[α]pyrene	6.8	1.4	ng/cigarette	207	2.25
1,3-Butadiene	38	5	µg/cigarette	207	2.38
Crotonaldehyde	11	2	µg/cigarette	207	2.40
Formaldehyde	27	11	µg/cigarette	207	3.33
Isoprene	320	101	µg/cigarette	207	3.73
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	71	16	ng/cigarette	207	3.16
NNN (*N*-nitrosonornicotine)	85	6	ng/cigarette	207	2.07
Toluene	53	11	µg/cigarette	207	3.71

Health Canada Intense (HCI) Smoking Regime					
Parameter	**Certified Value**	**Certified Uncertainty**	**Unit**	**Number of accepted data points**	**Coverage factor based on *t*-factor**
Total Particulate Matter (TPM)	46.8	3.4	mg/cigarette	207	2.79
Tar (Nicotine-free dry particulate matter)	29.1	1.9	mg/cigarette	207	2.80
CO (Carbon monoxide)	28.0	2.8	mg/cigarette	207	3.19
Nicotine	1.90	0.13	mg/cigarette	207	2.93
Puff count	8.69	0.36	Puff/cigarette	207	2.46
Acetaldehyde	1552	244	µg/cigarette	207	3.76
Acrolein	154	33	µg/cigarette	207	3.50
Acrylonitrile	24	10	µg/cigarette	207	3.83
4-Aminobiphenyl	2.3	1.0	ng/cigarette	207	3.65
1-Aminonaphthalene	24	13	ng/cigarette	207	3.32
2-Aminonaphthalene	14	9	ng/cigarette	207	3.60
Ammonia	30	5	µg/cigarette	207	2.91
Benzene	88	13	µg/cigarette	207	3.11
Benzo[α]pyrene	15	2	ng/cigarette	207	2.61
1,3-Butadiene	103	9	µg/cigarette	207	2.62
Crotonaldehyde	51	13	µg/cigarette	207	3.92
Formaldehyde	104	36	µg/cigarette	207	3.95
Isoprene	881	303	µg/cigarette	207	4.08
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	187	50	ng/cigarette	207	3.95
NNN (*N*-nitrosonornicotine)	212	47	ng/cigarette	207	3.11
Toluene	150	36	µg/cigarette	207	4.00

Tobacco filler					
Parameter	**Certified Value**	**Certified Uncertainty**	**Unit**	**Number of accepted data points**	**Coverage factor based on *t*-factor**
Ammonia	956	377	µg/g	207	4.21
Arsenic	247	58	ng/g	182	2.81
Cadmium	939	176	ng/g	206	3.91
Total nicotine	17978	649	µg/g	207	2.05
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	676	384	ng/g	207	3.70
NNN (*N*-nitrosonornicotine)	2131	450	ng/g	207	3.19

Physical Attributes					
Parameter	**Certified Value**	**Certified Uncertainty**	**Unit**	**Number of accepted data points**	**Coverage factor based on *t*-factor**
Cigarette circumference	24.6	0.8	mm	1810	3.63
Resistance to draw	107	4	mm H_2O	1810	2.01
Cigarette length	83.0	0.1	mm	1810	2.18
Cigarette mass	0.89	0.02	g/cigarette	1809	2.86
Filter pressure drop	137	2	mm H_2O	1810	2.00
Total ventilation	33	6	%	1810	2.43
Air permeability (cigarette paper)	45	4	$cm^3(min^{-1}.cm^{-2})$ at 1 kPa	1110	2.01
Tobacco filler mass	625	10	mg/cigarette	1370	2.03
Nominal diameter	7.83	0.28	mm	1370	3.62
Filter length	27.0	0.1	mm	1370	2.16
Tobacco filler moisture content	11.27	3.99	%	207	4.26
Tobacco filler pH	5.45	0.29	pH units	207	4.09
Apparent Filter density	0.123	0.005	g/cm^3	1140	2.51
Tobacco rod length	56.0	0.1	mm	1370	2.06

STATEMENT OF TRACEABILITY:
The reference values and uncertainties certified herein have been generated with, and traceable to, the ISO 17025-accredited analytical methods indicated below.

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: If this reference material is to be kept for longer than 10 days up to 3 months before conditioning, 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 is frozen and stored 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 expanded uncertainty certified herein.

NAMES AND SIGNATURES OF CERTIFYING OFFICERS:

Certificate Approved by:
Brent J. Shelton, Ph.D.
Statistical design and data processing

Certificate Approved by:
Socrates Jose P. Cañete, Ph.D.
Quality Control/Quality Assurance

Certificate Approved by:
Orlando D. Chambers, Ph.D.
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