Martin-Gatton College of Agriculture, Food and Environment
Center for Tobacco Reference Products
Telephone: (859) 257-2660
Fax: (859) 257-6012
Email: ctrp@uky.edu

University of Kentucky
Center for Tobacco Reference Products
1401 University Drive
Lexington, KY 40546-0236
www.ctrp.uky.edu

Reference Material Data Sheet

2R5F Reference Cigarette

Data Sheet Number: 2025-001CTRP2R5F
Reference Values Generated on: April 30, 2025
Reference values are valid until: April 30, 2030
Superseded data sheet: **NA**

Description of Material	Blended Cigarette, unflavored, 83 mm length
Lot/Batch Number	**2R5F**
Matrix	Tobacco blend
Major starting materials	Flue-cured, burley and Oriental tobacco types, reconstituted tobacco sheets, expanded flue-cured, expanded burley, glycerin, Isosweet (sugar)

1. Reference values listed below reflect analysis results submitted during CTRP Proficiency studies (References below) satisfying Clause 7.12 of ISO 17034:2016 and statistically evaluated using Clause 9.5 of ISO 33405:2024.
2. The "Reference Uncertainty" listed herein are expanded uncertainties obtained by multiplying the combined standard uncertainty by a constant coverage factor of 3, i.e. k = 3.
3. The reference values listed herein are reflective of chemical analysis done on a "as is" basis, i.e. the samples were not dried prior to analysis.
4. The values will be updated by the valid until date or as needed.

2R5F Reference Cigarette Values and Uncertainties

Non-intense (ISO 3308:2012) formerly identified as International Organization for Standardization (ISO) Smoking Regime

Parameter	Reference Value	Reference Uncertainty	Unit	Number of accepted data points	Constant Coverage Factor
Total Particulate Matter (TPM)	2.27	1.06	mg/cigarette	75	3
Tar (Nicotine-free dry particulate matter)	1.89	0.92	mg/cigarette	70	3
CO (Carbon monoxide)	3.0	0.9	mg/cigarette	75	3
Nicotine	0.184	0.057	mg/cigarette	75	3
Puff count	8.00	0.85	Puff/cigarette	70	3
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	20	7	ng/cigarette	25	3
NNN (N-nitrosonornicotine)	26	8	ng/cigarette	25	3
NAT (N-nitrosoanatabine)	29	9	ng/cigarette	25	3
NAB (N-nitrosoanabasine)	4	2	ng/cigarette	25	3
Water	0.15	0.16	ng/cigarette	68	3

Intense (ISO 20778:2018) formerly identified as Health Canada Intense (HCI) Smoking Regime

Parameter	Reference Value	Reference Uncertainty	Unit	Number of accepted data points	Constant Coverage Factor
Total Particulate Matter (TPM)	32.95	7.59	mg/cigarette	60	3
Tar (Nicotine-free dry particulate matter)	21.93	15.24	mg/cigarette	55	3
CO (Carbon monoxide)	24.4	4.4	mg/cigarette	60	3
Nicotine	1.304	0.259	mg/cigarette	60	3
Puff count	7.49	0.70	Puff/cigarette	60	3
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	122	35	ng/cigarette	30	3
NNN (N-nitrosonornicotine)	153	21	ng/cigarette	30	3
NAT (N-nitrosoanatabine)	175	40	ng/cigarette	30	3
NAB (N-nitrosoanabasine)	20	11	ng/cigarette	30	3
Water	10.98	5.90	ng/cigarette	60	3

Tobacco Filler					
Parameter	Reference Value	Reference Uncertainty	Unit	Number of accepted data points	Constant Coverage Factor
Ammonia	1061	454	µg/g	70	3
Arsenic	178	165	ng/g	85	3
Cadmium	1032	492	ng/g	85	3
Total nicotine	18190	2385	µg/g	75	3
NNK (4(methylnitrosamino)-1-(3-pyridyl)-1-butanone)	877	279	ng/g	85	3
NNN (N-nitrosonornicotine)	2656	945	ng/g	85	3
NAT (N-nitrosoanatabine)	2308	631	ng/g	85	3
NAB (N-nitrosoanabasine)	112	45	ng/g	85	3
Oven Volatiles	13.98	2.37	%	65	3
pH	5.40	0.13	pH units	80	3

Physical Attributes					
Parameter	Reference Value	Reference Uncertainty	Unit	Number of accepted data points	Constant Coverage Factor
Cigarette circumference	24.9	0.08	mm	30	3
Cigarette length	83.0	0.4	mm	25	3
Cigarette mass	831	18	mg/cigarette	30	3
Filter length	26.9	0.8	mm	25	3
Tipping paper length	32.2	0.53	mm	25	3
Tobacco filler mass	540	16	mg/cigarette	25	3
Resistance to draw (open)	117	8	mm H_20	30	3
Resistance to draw (closed)	205	16	mm H_20	30	3
Pressure drop	166	11	mm H_20	25	3
Total ventilation	70	3	%	20	3
Filter ventilation	69	2.5	%	30	3
Air permeability (cigarette paper)	36	16	$cm^3(min^{-1} \cdot cm^{-2})$ at 1 kPa	30	3
Firmness	71	7	%	25	3

REFERENCE VALUES AND UNCERTAINTIES: The Reference Values and Uncertainties for the mainstream smoke parameters contained herein are reflective only of data obtained from a Linear Smoking machine.

DATA AQUISITION: Data used in calculations for constituents were reported in multiple rounds of proficiency testing listed below.
CIG-2023A – TNCO in Non-intense and Intense
CIG-2023B – TSNA in Non-intense and Intense and physical parameters
CIG-2023C – Filler analysis

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 3402:2023. Smoke the reference cigarettes following ISO 3308:2012 "standard" (formerly the ISO smoking regime) or ISO 20778:2018 "Canadian modified" (formerly 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 “Reference Uncertainties” disclosed herein.

APPROVING PERSONNEL: This material is approved by Huihua Ji, C. Ruth McNees and Ling Yuan on behalf of CTRP.