



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

ENTHALPY ANALYTICAL, INC.
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CHEMICAL

Valid To: November 30, 2019

Certificate Number: 1873.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following types of tests on tobacco, tobacco smoke, and electronic cigarettes:

Mainstream (MS) and Sidestream (SS) Smoke Analysis:

<u>Test Description</u>	<u>Method</u>	<u>Test Procedure(s)</u>
Acetamide & Acrylamide (MS) by GC/MS	AM-127	
Ammonia (MS/SS) by HPLC	AM-011	HC T-101, HC T-201
Analytical Smoke Machines	SOP EQU-037	HC T-115, FR11178, FR45483 ISO3308, ISO3402, ISO4387, CRM No.64
Benzo(a)pyrene (MS) by HPLC	AM-207	HC T-103
Benzo(a)pyrene (SS) by HPLC	AM-208	HC T-203
Carbon Monoxide (MS) by NDIR	AM-007	HC T-115, HC T-214, FR11178, FR46483, ISO8454, CRM No.68
Carbonyls (MS) by UPLC	AM-076	HC T-104
Carbonyls (MS/SS) by HPLC	AM-005	HC T-204
Ethyl Carbamate by GC/MS	AM-175	
Eugenol (MS/SS) by HPLC	AM-087	HC T-105
Filter Efficiency (MS) by GC	AM-026	
Humectants (MS) by GC/FID	AM-105	HC T-115, HC T-304
Hydrogen Cyanide (MS/SS) by CFA	AM-111	HC T-107, HC T-205
Ignition Propensity	AM-050	ASTM 2187-04, ASTM 2187-09 ISO 12863:2010
Mercury (MS) by CVAA	AM-036	HC T-108
Mercury (SS) by CVAA	AM-041	HC T-206
Metals (MS) by ICP/MS	AM-021	HC T-109
Metals (SS) by ICP/MS	AM-043	HC T-207
Nicotine, Water, and Menthol (MS) by GC	AM-001	HC T-115, FR11178, FR46483 ISO10315, ISO10362-1, ISO4387 CRM No.65, No.66, No.67
Nitric Oxide (MS) by Chemiluminescence	AM-029	
Nitric Oxide (MS) by Chemiluminescence	AM-216	HC T-110
Nitric Oxide (SS) by Chemiluminescence	AM-034	
Nitric Oxide (SS) by Chemiluminescence	AM-217	HC T-208
pH (MS) by pH Meter	AM-016	

pH (MS) by pH Meter	AM-093	HC T-113
pH (SS) by pH Meter	AM-092	

<u>Test Description</u>	<u>Method</u>	<u>Test Procedure(s)</u>
Phenolics (MS) by HPLC	AM-027	HC T-114
Phenolics (SS) by HPLC	AM-048	HC T-211
Primary Aromatic Amines (MS/SS) by GC/MS	AM-030	HC T-102, HC T-202
Primary Aromatic Amines (MS) by GC/MS	AM-199	
Polycyclic Aromatic Hydrocarbons (MS) by GC/MS	AM-190	
Polycyclic Aromatic Hydrocarbons (MS/SS) by GC-MS	AM-044	
Semi-Volatiles (MS/SS) by GC/MS	AM-006	HC T-112, HC T-210
Tar, Nicotine, and CO (SS) by GC and NDIR	AM-008	HC T-212

Mainstream (MS) and Sidestream (SS) Smoke Analysis cont'd:

<u>Test Description</u>	<u>Method</u>	<u>Test Procedure(s)</u>
Tobacco Specific N-Nitrosamines (MS) by LC/MS/MS	AM-020	
Tobacco Specific N-Nitrosamines (MS) by GC	AM-210	HC T-111
Tobacco Specific N-Nitrosamines (SS) by GC	AM-211	HC T-209
Volatiles (MS/SS) by GC/MS	AM-015	HC T-116, HC T-213
Volatiles I (MS) by GC/MS	AM-180	
Volatiles II (MS) by GC/MS	AM-193	

Physical Properties:

<u>Test Description</u>	<u>Method</u>	<u>Test Procedure(s)</u>
Physical Properties	AM-009	ISO: 2971, 4387, 6565, 9512 CRM No.65
Permeability	AM-057	ISO2965
Weight of Cigars/Cigarettes per Thousand	AM-186	Tax Purposes

Tobacco:

<u>Test Description</u>	<u>Method</u>	<u>Test Procedure(s)</u>
Ammonia by HPLC	AM-115	HC T-302
Anions by HPLC	AM-110	
Benzo(a)pyrene by UPLC	AM-125	HC T-307
Carbonyls in Tobacco by UPLC-MS/MS	AM-240	
CDC Nicotine by GC-FID	AM-072	FR Volume 74, No. 4
CDC Oven Volatiles and pH by pH Meter	AM-071	FR Volume 74, No. 4, AOAC 966.02 (OV)
Methyl Salicylate (Wintergreen) and Ethyl Salicylate by GC/MS	AM-078	
Eugenol by HPLC	AM-088	HC T-314
Humectants by GC/FID	AM-090	HC T-304

Tobacco cont'd

Test Description	Method	Test Procedure(s)
Mercury by CVAA	AM-095	HC T-306
Metals by ICP/MS	AM-052	HC T-306
Minor Alkaloids by GC/MS	AM-100	
Nicotine by GC/MS	AM-100	
Nicotine by GC/NPD	AM-206	HC T-301
Nitrate by CFA	AM-218	HC T-308
Nitrite by CFA	AM-182	
Organic Nitrogen by CFA	AM-183	
Oven Volatiles by Gravimetric	AM-058	
pH by pH Meter	AM-053	HC T-310
Polycyclic Aromatic Hydrocarbons by GC/MS	AM-187	
Protein Nitrogen by CFA	AM-184	
Reducing Substances by CFA	AM-197	ISO 15153
Reducing Sugars by CFA	AM-074	CRM No. 38
Sodium Propionate by GC/MS	AM-170	
Sodium Propionate by GC-FID	AM-089	HC T-312
Sorbic Acid by HPLC	AM-098	HC T-313
Tobacco Specific N-Nitrosamines by LC/MS/MS	AM-031	
Tobacco Specific N-Nitrosamines by GC/TEA	AM-209	HC T-309
Total Alkaloids by CFA	AM-114	ISO15152
Total Sugars by CFA	AM-073	CRM No. 38
Total Sugars (as Reducing Sugars) by CFA	AM-113	FR Notice No 66, Volume 71
Triacetin by GC/MS	AM-099	HC T-311
Water Activity in Smokeless Tobacco	AM-233	

Toxicology Services:

Test Description	Method	Test Procedure(s)
Ames Assay	AM TOX-001	HC T-501
Neutral Red Uptake Assay	AM TOX-002	HC T-502
Micronucleus Assay	AM TOX-003	HC T-503
Sister Chromatid Exchange	AM TOX-004	
Micronucleus in Binucleated Cells	AM TOX-005	
Skin Irritation Assay	AM TOX-008	
Cytokine Analysis	AM TOX-009	
Mycoplasma Test	AM TOX-010	
Total Bacteria, Yeast and Mold Enumeration	AM TOX-011	BAM, 8 th edition, Rev. A, 1998. Ch 18, AOAC 966.23
Mainstream Smoke for Bacterial Reverse Mutation Assay	AM-122	HC T-122 Appendix I, HC T-115
Mainstream Smoke for Neutral Red Uptake Assay	AM-123	HC T-123 Appendix I, HC T-115

Mainstream Smoke for InVitro Micronucleus Assay	AM-124	HC T-124 Appendix I, HC T-115
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Electronic Cigarettes:

Test Description	Method
Carbonyls in E-Cigarette Aerosol By HPLC-UV	AM-236
Carbonyls in E-Cigarette Aerosol By HPLC-UV	AM-236
Carbonyls in E-Liquid by UPLC-UV	AM-239
Nicotine Degradants in E-Liquid and E-Cigarette Aerosol by LC-MS	AM-238
Nicotine Degradants in E-Liquid and E-Cigarette Aerosol by LC-MS	AM-238
Nicotine, Menthol and Humectants in E-liquid by GC-FID	AM-200
Nicotine, Menthol, Humectants and Contaminants in E-Cigarette Aerosol by GC-FID	AM-201
pH in Smoke and E-Cigarette Aerosol	AM-237
pH in Smoke and E-Cigarette Aerosol	AM-237
pH of E-Liquid	AM-232
pH of E-Liquid	AM-232
Primary Aromatic Amines (PAAs) in E-Cigarette Vapor by GC-MS	AM-221
Selected Carbonyls in E-liquid by GC-MS	AM-227
Selected Diketones In E-Liquid By GC/MS	AM-230
Selected Diketones In E-Liquid By GC/MS	AM-230
Selected Metals In E-Liquid and Trapped Aerosol By ICP/MS	AM-235
Selected Metals In E-Liquid and Trapped Aerosol By ICP/MS	AM-235
Tobacco Specific N-Nitrosamines in E-liquid by LCMSMS	AM-225
Tobacco-Specific N-Nitrosamines (TSNAs) in E-Cigarette Vapor by LCMSMS	AM-220
Water in E-Cigarette Vapor by GC-TCD	AM-223
Water in E-Cigarette Vapor by GC-TCD	AM-223
Water in E-liquid by GC-TCD	AM-222

Key:

FR = Federal Register / ISO = International Standards Organization / HC = Health Canada



Accredited Laboratory

A2LA has accredited

ENTHALPY ANALYTICAL, INC.

Richmond, VA

for technical competence in the field of

Chemical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).



Presented this 5th day of December 2017.

A handwritten signature in blue ink, written over a horizontal line.

President & CEO
For the Accreditation Council
Certificate Number 1873.01
Valid to November 30, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Chemical Scope of Accreditation.