National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1082

Cigarette Ignition Strength Standard

This Standard Reference Material (SRM) is intended for use by test laboratories to assess and control their testing of cigarette ignition strength in accordance with ASTM Standard Methods E2187 [1] and with the nearly identical ISO 12863 [2]. A unit of SRM 1082 consists of one carton of cigarettes containing 10 packs of 20 cigarettes each and is shipped on dry ice.

Certified Ignition Strength Value: The certified ignition strength value is given in Table 1. The measurand is ignition strength as defined by ASTM Method E2187-04. The certified value is traceable to NIST's result for the method. A NIST certified value is a value for which NIST has the highest confidence in its accuracy, in that all known or suspected sources of bias have been investigated or taken into account [3]. The certified value is the result of testing at NIST, Kidde-Fenwal, and the National Research Council, Canada. The certified value and its uncertainty were obtained by fitting a Bayesian hierarchical model [4] to the data from collaborating laboratories. The model accounts for random variation both within and between laboratories. The data from each laboratory was modeled using individual binomial likelihood functions, the between-laboratory variation was modeled using a beta distribution, and non-informative prior distributions were used for all parameters in the model. The model was fit to the data using Markov chain Monte Carlo methods. The expanded uncertainty, U, can be expressed as $U = ku_c$, where $u_c = 1.65$ % is the combined standard uncertainty, and the coverage factor, $k = 2$, corresponds to a 95 % confidence level. Tests for cigarette uniformity did not show evidence of any significant variation in ignition strength between packs.

Table l. Certified Ignition Strength Value for SRM 1082

Measurand	ASTM Method	Certified Ignition Strength Value
Ignition Strength (on 10 layers of filter paper)	E2187-04 [1][(a)]	12.6 % ± 3.3 %

[(a)] Standard Test Method for Measuring the Ignition Strength of Cigarettes.

Expiration of Certification: The certification of **SRM 1082** is valid, within the measurement uncertainty specified, until **31 December 2017**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Warning and Instructions for Handling, Storage, and Use"). This certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification.

Coordination of the technical measurements leading to certification was performed by R.G. Gann of the NIST Fire Research Division.

Ignition strength measurements at NIST were made by J. Lee of the NIST Fire Research Division.

Statistical consultation on experiment design and analysis of the certification data were performed by W.F. Guthrie of the NIST Statistical Engineering Division.

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Gaithersburg, MD 20899
Certificate Issue Date: 02 September 2015
Certificate Revision History on Last Page

Robert L. Watters, Jr., Director
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Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

WARNING AND INSTRUCTIONS FOR HANDLING, STORAGE, AND USE

Warning to Users: THERE ARE SUBSTANTIAL SAFETY HAZARDS ASSOCIATED WITH EXPOSURE TO BOTH PRIMARY AND SECOND-HAND SMOKE FROM CIGARETTES. THESE CIGARETTES ARE ONLY TO BE USED UNDER THE LABORATORY CONDITIONS DESCRIBED IN ASTM E2187-04.

Handling and Storage: ASTM E2187-04 and ISO 12863 state that cigarette test specimens are to be protected from physical or environmental damage while in handling and storage. It is important that the specimens not be crushed or deformed in any manner. Careful handling is needed to ensure that the specimens are not contaminated while in storage and that they are protected from degradation by insects. Test cigarettes are to be stored in a freezer at approximately 0 °C (32 °F). The test cigarettes removed from storage prior to testing should be used within one week.

Use: Prior to testing, the cigarettes are to be removed from the pack(s) and conditioned at a relative humidity of 55 % ± 5 % and a temperature of 23 °C ± 3 °C (73 °F ± 5 °F) for at least 24 h. The cigarettes are to be placed in a clean, open container, with the number of cigarettes being sufficiently small to enable free air access to the specimens, for example, a maximum of 20 cigarettes in a 250 mL polyethylene or glass beaker.

Material Selection and Packaging: The United States, Canada, Australia, and the European Union have enacted legislation requiring that all cigarettes sold in their jurisdictions must not exceed 25 % full-length burns using one of these test methods. A test consists of 40 determinations, each on a substrate consisting of 10 layers of filter paper. The filter paper is to meet the weight requirements in ASTM E2187-04 (ISO 12863 in Europe) and is to be conditioned prior to testing, as described in the ASTM and ISO standards.

This SRM was developed because cigarette companies, the New York Office of Fire Prevention and Control, and Health Canada indicated a need for a standard cigarette that could be used by testing laboratories and manufacturers to assess and control ignition strength testing to assure regulatory compliance and quality control. The planned cigarette was to have a target ignition strength near (a) the required pass/fail criterion and (b) the value to which cigarette companies would need to design products in order to assure success during compliance testing, which is somewhat lower than the pass/fail criterion.

After examining several prototypes, Philip Morris USA (Richmond, VA)[(1)] submitted the candidate standard cigarettes to NIST. The packs and cartons were printed to NIST specifications at the factory. The cigarettes themselves bear no markings.

REFERENCE

[1] ASTM E2187; *Standard Test Method for Measuring the Ignition Strength of Cigarettes*; Annual Book of ASTM Standards, Vol. 04.07, (2004).

[2] ISO 12863:2010; *Standard Test Method for Assessing the Ignition Propensity of Cigarettes*, 1st ed.; International Standards Organization, TC 92/SC 1; Geneva, Switzerland (2010).

[3] May, W.; Parris, R.; Beck II, C.; Fassett, J.; Greenberg, R.; Guenther, F.; Kramer, G.; Wise, S.; Gills, T.; Colbert, J.; Gettings, R.; MacDonald, B.; *Definition of Terms and Modes Used at NIST for Value Assignment of Reference Materials for Chemical Measurements*; NIST Special Publication 260-136 (2000); available at http://www.nist.gov/srm/upload/SP260-136.PDF (accessed Sep 2015).

[4] Gelman, A.; Carlin, J.B.; Stern, H.S.; Rubin, D.B.; *Bayesian Data Analysis*; Chapman and Hall: London (1995).

Certificate Revision History: 02 September 2015 (Change of expiration date; editorial changes); 28 November 2012 (References added; editorial changes); 06 May 2008 (Original certificate date).

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.

[(1)]Certain commercial equipment, instruments or materials are identified in this certificate to adequately specify the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.