National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1196

Standard Cigarette for Ignition Resistance Testing

This Standard Reference Material (SRM) is intended for use by test laboratories to test mattresses, upholstered furniture and its components, and thermal insulation for resistance to cigarette ignition in accordance with 16 CFR 1632 [1], 16 CFR 1634 (proposed) [2], and 16 CFR 1209 [3]. A unit of SRM 1196 consists of two cartons of cigarettes each containing 10 packs of 20 cigarettes.

Certified Ignition Strength Value: The certified ignition strength value is given in Table 1. 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. [4]. The certified value and its uncertainty were obtained by fitting a Bayesian hierarchical model [5] to the data using a binomial likelihood function and a flat, relatively non-informative prior distribution for the ignition strength of the cigarette. Tests for cigarette uniformity carried out by fitting a Bayesian hierarchical model to the data did not show evidence of any significant variation in ignition strength day-to-day or between cases, cartons, or packs [6].

The expanded uncertainty given in Table 1 is reported at the 95 % probability level. Although the expanded uncertainty of the certified value was not computed using the methods outlined in the ISO Guide [7], the results of the Bayesian analysis can be interpreted in essentially the same way as results from the ISO approach. The expanded uncertainty, U, can be expressed as $U = ku_c$, where $u_c = 1.05$ % is the combined standard uncertainty, and the coverage factor, $k = 2$, is determined from the Student's t-distribution corresponding to 60 degrees of freedom. Alternatively, a Beta (722,80) posterior distribution for the certified ignition strength also may be used for subsequent Bayesian uncertainty calculations.

Table l. Certified Ignition Strength Value for SRM 1196

Measurand	Test Method	Certified Ignition Strength Value
Ignition strength (on 6.35 mm brass plate plus 2 layers of filter paper)	ASTM E2187 [8][(a)]	90.0 % ± 2.1 %

[(a)] Standard Test Method for Measuring the Ignition Strength of Cigarettes, as modified in NIST Technical Note 1627, Modification of ASTM E2187 for Measuring the Ignition Propensity of Conventional Cigarettes, June 2009.

Expiration of Certification: The certification of **SRM 1196** is valid, within the measurement uncertainty specified, until **31 August 2020**, 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"). The 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) will facilitate notification.

The 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 A-M. Callsen of the NIST Fire Research Division.

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

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 FOR LABORATORY USE ONLY.

Handling and Storage: In general, 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: The cigarettes are intended for use in testing prescribed in Federal regulations (16 CFR Part 1632, 16 CFR Part 1209, and the proposed 16 CFR Part 1634) and in California Technical Bulletin 117 [10]. Additional Standards for which the cigarettes are intended are NFPA 260 [11] and 261 [12] and ASTM E1352 [13] and ASTM E1353 [14]. These methods describe the procedures for proper handling of the cigarettes and conduct of the testing. For use in a test method, cigarettes should be conditioned as specified in that test method. If there is insufficient information on conditioning, the cigarettes should be conditioned as specified in ASTM E2187-09.

Material Selection and Packaging[(1)]: Federal regulations for smoldering ignition of mattresses and mattress pads (16 CFR 1632), cellulosic insulation (16 CFR 1209), and a draft proposed rule for upholstered furniture 16 CFR 1634, proposed) specify a standard cigarette ignition source. These regulations are promulgated by the Consumer Product Safety Commission (CPSC). In the past, the test cigarette specification was met by a conventional, unfiltered commercial cigarette. These cigarettes had been characterized by their physical properties. Their ignition propensity was determined to be the strongest of the contemporaneous brands, but was not quantified. In February 2008, that cigarette's manufacturer ceased production of the conventional version in order to comply with “fire-safe" cigarette legislation in various markets across the country.

The fire safety of upholstered furniture and mattresses had improved markedly since the initiation of cigarette ignition resistance testing in the 1970s. Thus, a replacement ignition source was needed. Under CPSC sponsorship, NIST modified ASTM E 2187 to enable measurement of the ignition propensity of the current test cigarettes (CTC) and made such measurements. NIST then solicited proposals from manufacturers to develop SRM 1196 cigarettes as a close approximation to the CTC in physical properties and test results. The contract was awarded to Altria Client Services (ACS) of Richmond, VA. ACS manufactured several prototypes, which were evaluated by NIST. This process led to a design that was a satisfactory replica of the CTC. ACS then manufactured the candidate standard cigarettes and submitted them to NIST. The packs and cartons were printed to NIST specifications at the factory.

[(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.

REFERENCES

[1] CPSC 16 CFR 1632; *Standard for Flammability of Mattresses and Mattress Pads*; Consumer Product Safety Commission Part 1632; Office of the Federal Register.

[2] CPSC 16 CFR 1634; *Standard for Flammability of Residential Upholstered Furniture*; Proposed Rule, Consumer Product Safety Commission Part 1634; Office of the Federal Register.

[3] CPSC 16 CFR 1209; *Interim Safety Standard for Cellulose Insulation*; Consumer Product Safety Commission Part 1209; Office of the Federal Register.

[4] 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/publications.cfm (accessed Nov 2012).

[5] Lee, P.M.; *Bayesian Statistics*, 2nd ed., Arnold: London, p. 344 (1997).

[6] Spiegelhalter, D.J.; Best, N.G.; Carlin, B.P.; Van Der Linde, A.; *Bayesian Measures of Model Complexity and Fit (with discussion)*; J. Roy. Statist. Soc., Series B, Vol. 64, pp. 583–640 (2002).

[7] JCGM 100:2008; *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement* (ISO GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Nov 2012); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at http://www.nist.gov/physlab/pubs/index.cfm (accessed Nov 2012).

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

[9] Gann, R.G.; Hnetkovsky, E.; *Modification of ASTM E2187 for Measuring the Ignition Propensity of Conventional Cigarettes*; NIST Technical Note 1627; U.S. Government Printing Office: Washington, DC (2009); available at http://www.nist.gov/manuscript-publication-search.cfm?pub_id=902075 (accessed Nov 2012).

[10] California Technical Bulletin 117; *Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture*; State of California Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation: North Highlands, CA (2000).

[11] NFPA 260; *Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture*; National Fire Protection Association (2009).

[12] NFPA 261; *Standard Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes*; National Fire Protection Association (2009).

[13] ASTM E1352; *Standard Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies*; Annual Book of ASTM Standards, Vol. 04.07.

[14] ASTM E1353; *Standard Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture*; Annual Book of ASTM Standards, Vol. 04.07.

Certificate Revision History: 29 November 2012 (Test method use information added; editorial changes); 15 March 2011 (Revision reflects an increase in unit size); 10 September 2010 (Original certification 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.