



Designation: D8342/D8342M – 21

Standard Test Method for Measuring the Probability of a Full Length Burn on a Cannabis/Hemp Pre-roll¹

This standard is issued under the fixed designation D8342/D8342M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This fire-test-response standard provides a standard measure of the probability of a cannabis/hemp pre-roll positioned on a substrate to generate enough heat to continue burning and thus potentially cause ignition of bedding or upholstered furniture.

1.2 This test method shall be applicable to pre-roll units that are intended for personal inhalation by means of combustion and contain dried herbal material from any type of a cannabis plant, that is, cannabis/hemp. For the sake of brevity, the term “cannabis” shall be used henceforth to refer to any type of cannabis plant (cannabis/hemp).

1.3 This test method shall be applicable to pre-rolls that burn along the length of a cannabis pre-roll column.

1.4 This test method shall not be applicable to infused pre-rolls, which are outside the scope of this standard.

1.5 Pre-roll preparation and sampling shall be made using Practice [D8343/D8343M](#).

1.6 *Units*—The values stated in either SI units or United States Customary units (USC units) are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Metric units will be stated as standard and USC units will be shown in brackets relative to the metric units.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee [D37](#) on Cannabis and is the direct responsibility of Subcommittee [D37.04](#) on Processing and Handling.

Current edition approved June 1, 2021. Published September 2021. DOI: 10.1520/D8342_D8342M-21.

Developed in accordance with the principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

[D8245](#) Guide for Disposal of Resin-Containing Cannabis Raw Materials and Downstream Products

[D8343/D8343M](#) Practice for Measuring the Physical Properties of Cannabis/Hemp Pre-rolls

[E177](#) Practice for Use of the Terms Precision and Bias in ASTM Test Methods

[E691](#) Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

[E1352](#) Test Method for Cigarette Ignition Resistance of Mock-Up Upholstered Furniture Assemblies

[E1353](#) Test Methods for Cigarette Ignition Resistance of Components of Upholstered Furniture

2.2 NFPA Standards:³

[NFPA 260](#) Standard Methods of Tests and Classification Systems for Cigarette Ignition Resistance of Components of Upholstered Furniture (2019)

[NFPA 261](#) Standard Method of Test for Determining Resistance of Mock-up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes (2018)

2.3 Other Standards:

[16 CFR 1632](#) Standard for the Flammability of Mattresses and Mattress Pads (FF 4-72, Amended)⁴

[NIST 851-2](#) Test Methods for Quantifying the Propensity of Cigarettes to Ignite Soft Furnishings, Volume 2⁵

[NIST 1436](#) Relative Ignition of Propensity of Test Market Cigarettes⁵

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

⁴ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

⁵ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *crutch filter, n*—a filter composed of thin paper material used in a pre-roll for preventing particles from being inhaled. Also provides stability and allows cannabis herbal material to be fully combusted. (See Fig. 1.)

3.1.2 *crutch pre-roll, n*—a type of pre-roll that contains a crutch filter and uses a single wrapping paper, which can be conical, cylindrical, or other shapes. (See Fig. 1.)

3.1.3 *determination, n*—the act of coming to a decision or of fixing or setting a purpose.

3.1.4 *filter pre-roll, n*—a type of pre-roll that contains filter material and uses a tipping paper.

3.1.5 *full-length burn, n*—the outcome of a determination in which the pre-roll burns to or past the front plane of the crutch filter or, if the pre-roll has no filter, past the tips of the metal pins. (See Fig. 3.)

3.1.6 *infused pre-roll, n*—a type of pre-roll that combines dried cannabis herbal material (flower or leaf) and other cannabinoid containing materials (for example, kief, wax, crumble, etc.) including resins and/or extracts.

3.1.6.1 *Discussion*—Kief, wax, and crumble are common names used in the cannabis industry for malleable texture concentrates that can be sprinkled over top dried cannabis herbal material.

3.1.7 *moisture content, n*—the quantity of water contained in a material. Used in a wide range of scientific and technical areas and expressed as a ratio or percentage, which can range from completely dry to the value of the materials' porosity at saturation.

3.1.8 *moisture content (MC) measuring device, n*—an analog or electronic device with a sensor or detector used to measure the moisture content in materials capable of measuring within $\pm 5\%$ moisture content.

3.1.9 *substrate, n*—a material that provides the surface on which something is deposited.

3.2 Abbreviated Term—Acronyms and Initialisms:

3.2.1 *CFR*—Code of Federal Regulations

3.2.2 *MC*—moisture content.

3.2.3 *NFPA*—National Fire Protection Association

3.2.4 *PMMA*—polymethyl methacrylate

3.2.5 *RH*—relative humidity

3.2.6 *QMS*—quality management system

4. Summary of Test Method

4.1 This test method measures the probability that a pre-roll, placed on a substrate, will generate enough heat to continue burning until it self-extinguishes or completely combusts. Each test determination consists of placing a lit pre-roll on a horizontal surface consisting of a pre-determined set number of layers of laboratory filter paper on a flat surface for support. Testing will begin with two substrates consisting of 15 and 10 layers of filter paper respectively for a full-length burn. If no full-length burn is observed with substrates of 15 and 10 layers of filter paper, then substrates consisting of three layers of filter paper are assembled and used for the duration of the test. Observation is made of whether or not the pre-roll continues to burn to the beginning or to the end of the crutch or filter, or both (see Fig. 1). Thirty determinations (comprising one test) are performed to determine the probability that the pre-roll will continue burning despite heat abstraction by the substrate. The number of determinations can vary on a case-by-case basis dependent on sample size. Sample size should represent a statistical size of production batches when using this test method for analyzing pre-rolls meant for sale.

4.2 This test method also measures the moisture content of the cannabis herbal material in the pre-roll using a moisture content measuring device.

5. Significance and Use

5.1 According to statistics provided by the NFPA, one of the most common initiating events in a fatal fire is the dropping of a smoking material, such as a pre-roll, onto a bed or a piece of upholstered furniture. Test Methods E1352 and E1353 and NFPA 261 and NFPA 260 have been developed to evaluate the susceptibility of upholstered furniture mock-ups and components to ignition by cigarettes (similarly for pre-rolls). Federal Standard 16 CFR 1632 was promulgated to reduce the likelihood that mattresses and mattress pads would ignite from a lighted smoking material. Research of test methods (NIST 851-2) has found that filter paper substrates can be used to replace the fabric/padding assembly with multiple layers of common filter paper showing a systematic progression in measuring ignition strength. Additionally, smoking materials with high percentages of full-length burns on filter paper substrates (NIST 1436) generate enough heat to keep burning and thus are more likely to ignite soft furnishings than smoking materials with lower percentages of full-length burns.

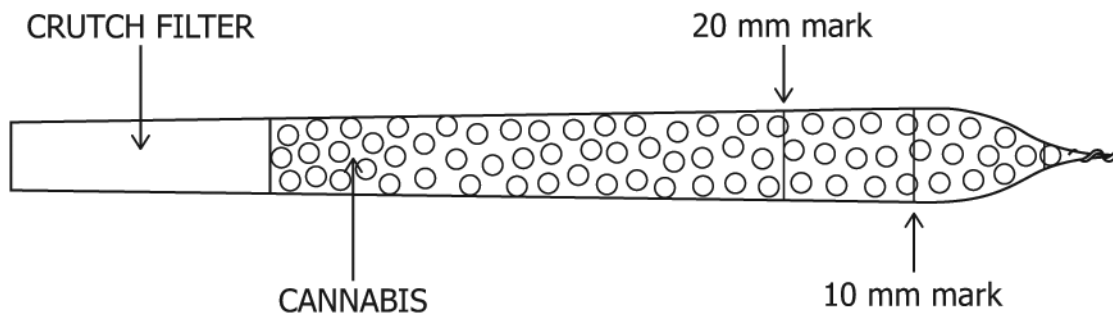


FIG. 1 Crutch Pre-roll

5.2 In this test method, the pre-rolls are subjected to a set of laboratory conditions. If different conditions are substituted or the end-use conditions are changed, it may not be possible to use this test method to predict quantitative changes in the fire test response. Therefore, the quantitative results are valid only for the fire test exposure conditions described in this test method. Pre-roll preparation and sampling are very important to ensure minimal impact on results. Preparation shall be made using Practice D8343/D8343M.

5.3 This test method outlines the moisture content of cannabis herbal material in the pre-roll. Determining the moisture content of cannabis herbal material used will shed more light on the effects of moisture on the probability of a pre-roll to achieve a full-length burn when ignited.

5.4 The data from this test method can help extrapolate whether a sample set of pre-rolls would maintain ignition if remained untouched.

5.5 This test method can be used to determine the probability of a full-length burn on cannabis/hemp pre-roll.

6. Apparatus

6.1 Substrates:

6.1.1 *Filter Paper, Grade 1*, ash-free cellulose filter paper shall be used as the filter paper for substrate formation. Characteristics: nominal diameter of 150 mm [6 in.], nominal ash content ≤0.06 %, pore size: 11 μm [0.00043 in.] (particle retention), nominal thickness 180 μm [0.0071 in.], base weight 87 g/m² [0.029 oz/yd²].

6.1.2 *Filter Paper*—The mean mass of 15 sheets of filter papers shall be 23 g ± 0.5 g [0.81 oz ± 0.017 oz].

6.1.3 Substrates shall be formed by placing multiple layers of filter papers as applicable per test requirement and procedure in Section 11.

6.1.3.1 *Substrate #1*—15 layers of filter papers.

6.1.3.2 *Substrate #2*—10 layers of filter papers.

6.1.3.3 *Substrate #3*—3 layers of filter papers

6.2 Moisture Content Measuring Device:

6.2.1 *Near Infrared Reflectance Spectroscopy (NIRS) Moisture Meter*, suited for the real-time measurement of moisture content, capable of measuring within ±5 % MC.

6.3 Test Chamber:

6.3.1 A test chamber, as pictured in Fig. 2, shall be constructed of clear plastic material, such as polymethyl methacrylate (PMMA), or similarly clear rigid material, nominal 5 mm [0.20 in.] in thickness. The test chamber inside dimensions shall be as follows: height: 402 mm ± 5 mm [15.8 in. ± 0.20 in.], width: 352 mm ± 5 mm [13.8 in. ± 0.20 in.], and depth: 298 mm ± 5 mm [11.73 in. ± 0.20 in.]. The full front panel of the chamber shall be hinged with a latch for closure. Standard silicone adhesive strip seals, width 12.7 mm ± 1 mm [0.5 in. ± 0.04 in.], thickness 1 mm ± 0.5 mm [0.04 in. ± 0.02 in.] shall be applied to the outer front panel surface, on top, bottom, and latch sides. Silicone adhesive strip seals shall extend approximately 6.35 mm [0.25 in.] from three outer edges along the lengths, to ensure the door seals tight when closed.

6.3.2 The top panel of the chamber shall contain a centered round opening of diameter of 152.7 mm ± 1 mm [6.01 in. ± 0.04 in.] from which a cylindrical plastic chimney, with the same inside diameter and nominal thickness of 5 mm [0.20 in.], will extend 165 mm ± 6 mm [6.50 in. ± 0.24 in.] above the chamber. The chimney shall be sealed to the outer top panel surface.

6.3.3 A flat top chimney cover shall be constructed with an internal seal to sit on top of the cylindrical chimney as shown in Fig. 2. The flat top chimney cover dimensions shall be as follows: inner diameter: 175 mm ± 1 mm [6.9 in. ± 0.04 in.]

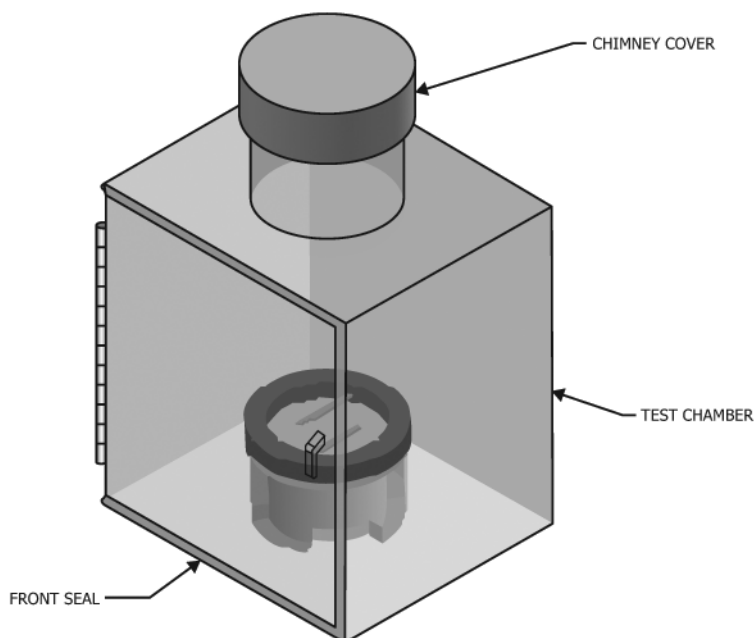


FIG. 2 Test Chamber

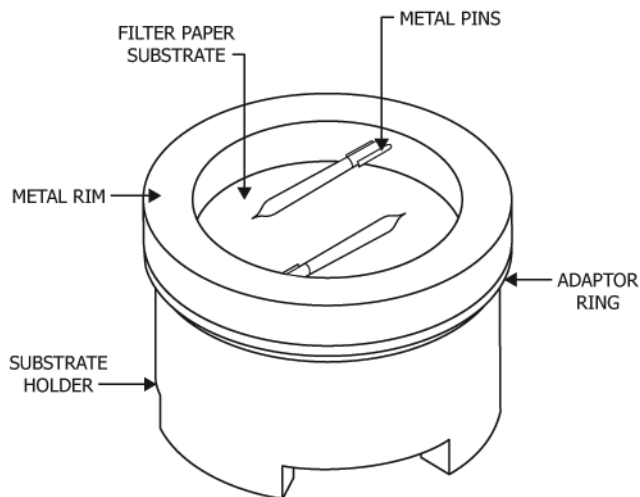


FIG. 3 Substrate Holder Assembly

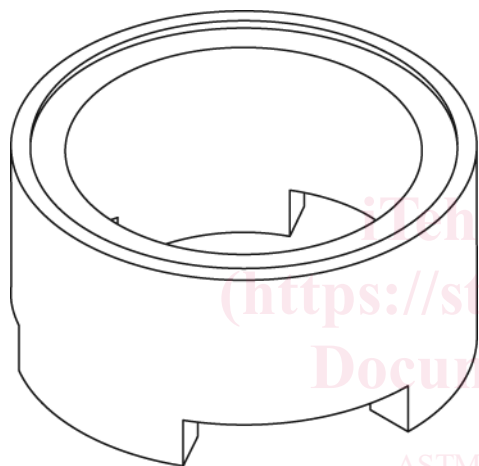


FIG. 4 Substrate Holder

and inner height: 63.5 mm ± 1 mm [2.5 in. ± 0.04 in.]; nominal thickness of 5 mm [0.20 in.].

6.4 Substrate Holder Assembly: Fig. 3.

6.4.1 An apparatus composed of components: a substrate holder, an adaptor ring, a metal rim, and metal pins.

6.4.2 Substrate Holder—The substrate holder, as shown in Fig. 4, shall be made of PMMA or similarly rigid material with three legs for stability to sit above the chamber floor. The substrate holder dimensions shall be as follows: outer diameter: 165.6 mm ± 1 mm [6.51 in. ± 0.04 in.], inner diameter: 127 mm ± 1 mm [5 in. ± 0.04 in.], and total height: 82.9 mm ± 1 mm [3.26 in. ± 0.04 in.] inclusive of the three legs approximately 20 mm [0.80 in.] in height. The legs approximately 80 mm [3.15 in.] wide will be spaced 120° ± 5° apart around the bottom surface of substrate holder perimeter. The top surface of the substrate holder shall have a recess diameter 152.8 mm ± 1 mm [6 in. ± 0.04 in.], 2.5 mm [0.01 in.] deep.

6.4.3 Adaptor Ring—An adaptor ring to support the filter paper substrate shall be made of PMMA or other similarly rigid material. The adaptor ring dimensions shall be as follows: outer flange diameter: 176.8 mm ± 1 mm [6.96 in. ± 0.04 in.], flange thickness 5.5 mm ± 1 mm [0.22 in. ± 0.04 in.], outer

cylinder diameter to 150.4 mm ± 1 mm [5.92 in. ± 0.04 in.], inner diameter: 127 mm ± 1 mm [5 in. ± 0.04 in.], and height: 15.5 mm ± 1 mm [0.61 in. ± 0.04 in.]. The top surface of the flange of the adaptor ring shall be flat to within ±0.03 mm [0.001 in.]. A schematic of the adaptor ring is shown in Fig. 5.

6.4.4 Metal Rim and Pins—A circular brass or other dense metal rim, as shown in Fig. 6, shall be used as a weight to hold the sheet(s) of filter paper flat against each other. The bottom surface of the metal rim shall be flat to within ±0.03 mm [0.001 in.]. The metal rim dimensions shall be as follows: outer diameter: 176.8 mm ± 1 mm [6.96 in. ± 0.04 in.], inner diameter: 130 mm ± 1 mm [5.1 in. ± 0.04 in.].

6.4.4.1 Two pairs of parallel metal pins are to be located 20 mm ± 1 mm [0.79 in. ± 0.04 in.] from center, opposite to each other. The pins are welded to the metal rim, 10 mm ± 0.5 mm [0.4 in. ± 0.02 in.] above the bottom surface of metal rim. Each pin, 2 mm ± 0.05 mm [0.08 in. ± 0.02 in.] in diameter and located 6.3 mm ± 0.05 mm [0.32 in. ± 0.02 in.] apart, shall protrude 17 mm ± 4 mm [0.65 in. ± 0.15 in.] toward the center of the metal rim in a horizontal position. The metal pins serve as a pre-roll holder to support the non-ignited (filter side) of the lit pre-roll in a horizontal position without pressing or compressing the pre-roll. The metal pins should not be in contact with the pre-roll lit end.

6.4.4.2 The mass of the metal rim shall be 600 g ± 10 g [21.16 oz ± 0.035 oz]. If the mass of a rim is lower, a stacked second metal rim shall bring the total mass to 600 g ± 10 g [21.16 oz ± 0.035 oz].

6.5 Pre-roll Ignition System:

6.5.1 A system consisting of an air draw component, a pre-roll holder, and an ignition source shall be used to ignite the test pre-rolls.

6.5.2 Air Draw Component (Part of Canopy and Exhaust System)—A standard laboratory air draw component shall be used such as a flexible “spot exhaust,” “snorkel,” or similar fume exhaust hose and shall be connected to the chimney of the chamber and have sufficient air flow to slowly draw air from the pre-rolls once lit to establish uniform end burn.

6.5.3 Pre-roll Holder—The pre-roll holder shall be used to support the lit pre-roll in a horizontal position to establish a uniform end burn prior to the placement of the pre-roll into the substrate holder. The pins are to be spaced to keep the non-ignited end of the pre-roll from rolling, but without compressing the pre-roll. If a pre-roll with a significantly different diameter is to be tested, other pairs of pins, appropriately spaced, shall be inserted into the block. The holder shall not clamp the pre-roll nor stress it in any other manner, nor shall it contact the pre-roll within a nominal 30 mm [1.2 in.] of its lit end.

6.5.4 Ignition Source:—A butane gas lighter or other similar type device shall be used for lighting the pre-roll.

6.6 Exhaust System:

6.6.1 An exhaust system, such as that contained in a chemical fume or canopy style hood with direct air flow through the hood, shall be used for removing pre-roll and substrate combustion products during the test. The system shall contain an appropriate filtering media, such as an activated charcoal filter or activated carbon filter, to remove pre-roll

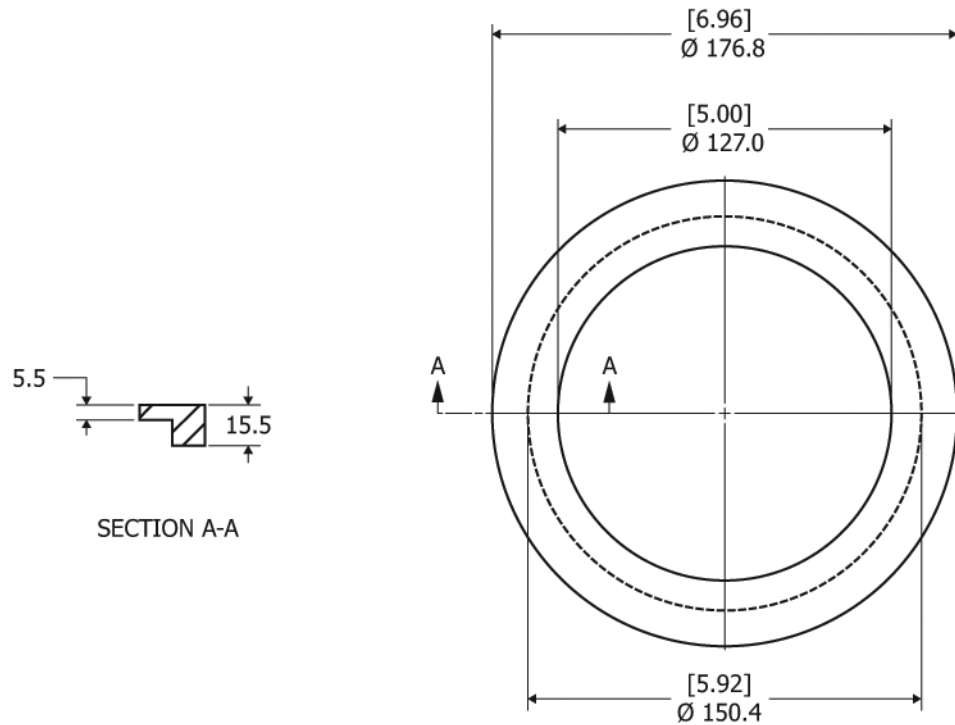


FIG. 5 Schematic of Adaptor Ring

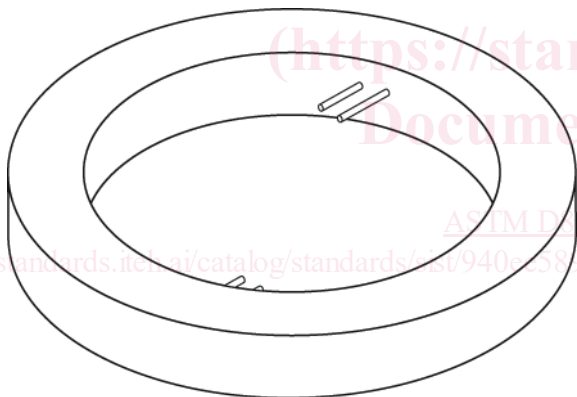


FIG. 6 Metal Rim and Metal Pins

smoke and condensable combustion gases. Airflow through the hood shall be sufficient to remove pre-roll and substrate combustion products while not being high enough to influence the combustion process in the test chamber.

6.7 Extinguishing System:

6.7.1 Following a test cycle, the pre-roll and sheets of filter paper shall be completely extinguished by smothering or other suitable process, such as application of water.

7. Hazards

7.1 This test method involves the use of combustible materials that are exposed to ignition sources. Consequently, the user will take proper precautions to avoid thermal injuries.

7.2 Personnel shall be trained and instructed in accordance to quality management system (QMS) measures on general procedures of how to handle an unwanted fire. Appropriate fire

extinguishing equipment will be immediately available during testing to suppress any fires that exceed normal controlled limits.

7.3 Personnel will take proper precautions to avoid inhaling combustion products.

7.4 Exhaust systems shall be used and checked regularly in accordance with manufacturing specifications in accordance to QMS measures.

7.5 The user shall ensure that all burning has ceased before discarding used test materials. An appropriate closed waste container shall be used for safe disposal of pre-rolls and test assemblies after being exposed to heat and fire.

7.6 This test method involves the use of apparatus and equipment at high temperature and must be handled with care in accordance with manufacturer’s specifications and QMS measures. The user will take proper precautions to avoid thermal injury.

8. Sampling, Test Specimens, and Test Units

8.1 Pre-roll Preparation:

8.1.1 Pre-roll preparation, sampling, and handling are very important to ensure minimal impact on results. Preparation shall be made using Practice D8343/D8343M.

8.2 Pre-rolls:

8.2.1 All pre-rolls used in this test method shall be handled by holding the un-lit crutch filter section of the pre-roll at all times with clean and gloved hands only.

8.2.2 Prior to the ignition test, all pre-roll test specimens shall be marked using a soft graphite pencil at 10 mm ± 1 mm [0.39 in. ± 0.04 in.] and 20 mm ± 1 mm [0.79 in. ± 0.08 in.]