Reference Manual Book 5: Laboratory Policies and Procedures

Part B: Test Method Section

Method F26 : Ignition Propensity of Cigarettes

1 SCOPE

1.1 This method describes procedures for testing cigarettes in accordance with:

- the *Cigarette Ignition Propensity (Consumer Products) Regulations* under the *Canada Consumer Product Safety Act*; or
- ASTM E2187-20a Standard Test Method for Measuring the Ignition Strength of Cigarettes using a single layer of filter paper on a thin sheet of stainless steel substrate.

1.2 This method covers all types of cigarettes.

2 APPLICABLE DOCUMENTS

2.1 ASTM E2187-20a: Standard test method for measuring the ignition strength of cigarettes

2.2 *Cigarette Ignition Propensity (Consumer Products) Regulations* (SOR/2016-103)

2.3 *Canada Consumer Product Safety Act* (S.C. 2010, c. 21)

2.4 ISO 8243:2013 Cigarettes — Sampling

2.5 ISO 12863:2010 Standard test method for assessing the ignition propensity of cigarettes

2.6 SOP53: Verification of Rulers and Similar Measuring Devices

2.7 SOP61: Flammability Verification of Balances

2.8 SOP81: Caron Environmental Chamber

3 APPLICABLE SOFTWARE

3.1 PSL-F26 Filter Paper mass requirements

3.2 PSL-F26 Log Sheet for Stainless Steel Plate Replicates

3.3 PSL-F26 Result of analysis sheet

4 DEFINITION

4.1 Determination: Single measurement involving a lit cigarette placed on a selected substrate

4.2 Full-length burn: Outcome of a determination in which the cigarette continues to burn to or past the front plane of the tipping paper (filter tip cigarettes) or past the tips of the metal pins for non-filter tip cigarettes

4.3 No full-length burn: Outcome of a determination in which the cigarette ceases to burn before reaching the front plane of the tipping paper (filter tip cigarettes) or the tips of the metal pins for non-filter tip cigarettes

4.4 Pre-burn stage: While the cigarette is burning on the cigarette holder.

4.5 Substrate: Horizontal surface consisting of layers of filter paper or stainless steel sheet and filter paper on which a test cigarette is placed for testing

4.6 Test: Set of 40 determinations

5 APPARATUS

5.1 General

5.1.1 The substrates consist of nominal 150 mm diameter circles of certified Whatman No. 2 cellulosic filter paper. The filter paper mass shall be verified by using the PSL-F26 Filter Paper mass requirements sheet when receiving a new manufacturer's batch.

5.1.2 If using the ASTM E2187 method, in addition to 5.1.1, a plate of a nominal 159 mm by 150 mm rectangle of full hard 302 stainless steel. The stainless steel plate shall be flat and the thickness shall be 0.203 mm ± 0.004 mm.

5.1.3 Granite surface that is flat to within 0.025 mm over an area of at least 200 mm by 200 mm

5.1.4 2 mm diameter precision ground steel rod

5.1.5 Balance with a capacity of at least 30 g and a resolution of 0.01 g or better

5.2 Marking and sample identification

5.2.1 Ruler graduated to 1 mm

5.2.2 Caliper with resolution of 0.1 mm or better

5.2.3 Soft graphite pencil

5.2.4 Small plastic cups approx. 50 mm in diameter and 70 mm in height

5.3 Conditioning

5.3.1 Environmental chamber capable of maintaining 23 °C ± 3 °C and a relative humidity of 55 % ± 5 % for a least one week.

5.3.2 Refrigerated incubator or freezer capable of maintaining a temperature between -20 °C and 0 °C.

5.3.3 Temperature and relative humidity recorder capable of measuring to the nearest 0.5 °C and RH of 1 %.

5.4 Testing

5.4.1 Clear plastic test chambers such as polymethylmethacrylate (PMMA) (inside height: 340 mm ± 25 mm, inside width: 292 mm ± 6 mm, inside depth: 394 mm ± 6 mm) with a flattop cylindrical chimney (height: 165 mm ± 13 mm, Inside diameter: 152 mm ± 6 mm)

5.4.2 Chimney cover

5.4.3 Lighter and cigarette ignition system

5.4.4 Cigarette holder

5.4.5 Substrate holder with an outer diameter of 165 mm ± 1 mm, an inner diameter of 127 mm ± 1 mm and a height of 50 mm ± 1 mm. A recess in the top, 10 mm ± 2.5 mm deep, shall expand the inner diameter to 152 mm ± 1 mm. Three or four legs shall raise the bottom of the holder approximately 20 mm ± 1 mm above the chamber floor.

5.4.6 Circular brass rim with an outside diameter of 150 mm ± 1 mm and shall not exceed the inner diameter of the recess in the substrate holder. The inner diameter shall be 130 mm ± 2 mm. A pair of parallel metal pins, each approximately 1 mm in diameter and whose inner distance is 8.1 mm ± 0.05 mm apart, shall be located 3.2 mm ± 0.05 mm from the bottom of the rim and shall protrude 17 mm ± 1 mm toward the centre of the rim.

Note: The inner distance of 8.1 mm ± 0.05 mm between the metal pins is for conventional cigarettes of 25 mm circumference. For significantly different cigarette diameters, refer to ISO 12863 section 5.5 or ASTM E2187 section 7.5 and consult with the project lead or section head.

5.4.6.1 For ISO 12863, the thickness of the brass rim shall be 6.4 mm ± 1 mm and the mass shall be between 235 g and 295 g.

5.4.6.2 For ASTM E2187, the mass of the brass rim shall be 600 g ± 10 g.

5.4.7 For ASTM E2187 only, an adapter ring to support the stainless steel plate and the filter paper shall be made of PMMA with the following dimensions: outer diameter 165 mm ± 1 mm, inner diameter 126 mm ± 1 mm, height 15.5 mm ± 1 mm. A recess in the bottom, 10 mm ± 1 mm deep, shall decrease the outer diameter to 150 mm ± 1 mm. The top surface of the adapter shall be flat to within ± 0.03 mm.

6 PROCEDURE

6.1 All steps are from ISO 12863 except where specified.

6.2 Sample preparation

6.2.1 Take a picture of the sample as received and before testing.

6.2.2 Place all samples in the freezer within one week from the shipping date.

6.2.3 Remove the samples from the freezer at least 24 hours prior to testing.

6.2.4 If there is an unusual sample size, seek advice from the project lead or the section head.

6.3 Location of Tipping Paper and Cigarette Circumference

6.3.1 Randomly select 3 cigarettes. Measure and record the total length and the diameter of each cigarette. Calculate the cigarette circumference.

6.3.2 Cut each cigarette lengthwise along the paper seam from the middle of the cigarette to the end of the filter. Carefully remove the tobacco to expose the tipping paper.

6.3.3 Carefully measure the full length of the tipping paper. Record this measurement.

6.4 Subsampling and marking

6.4.1 If there are more than 5 cartons, choose 5 randomly and open them.

6.4.2 If there are less than 5 cartons, open all cartons.

6.4.3 Identify each sample carton sequentially (e.g., 1, 2, 3, etc.).

6.4.4 Open each carton and identify each pack.

6.4.4.1 Example: For carton number 2, number packs 2.1, 2.2, 2.3, etc.

6.4.5 Randomly select 2 cigarettes from each pack. Use a soft graphite pencil, mark them at the 5 mm ± 1 mm and 15 mm ± 1 mm from the end of the cigarette that will be lit. Refer to Figure 1.

Figure 1 Example of marking of cigarettes

6.4.6 Place each group of 2 cigarettes from the same pack in a numbered cup. Refer to Figure 2.

Figure 2 Example of cigarettes placed in numbered cup

6.4.7 If there are less than 5 cartons, fill cups with groups of 2 cigarettes from random open packs until 40 cups are obtained.

6.4.8 Record each cigarette with the corresponding cup on the Results of Analysis sheet.

6.5 Filter paper mass requirements (only when receiving a new batch)

6.5.1 This shall be determined by weighing 5 sets of 15 sheets, each set from a different box from the manufacturer's batch. Determinations shall be conducted with the rough sides of all paper sheets facing up. Record information on the PSL-F26 Filter paper mass requirements sheet.

6.5.2 The mean mass of the conditioned filter papers shall be 26.1 g ± 0.5 g and the standard deviation shall be no more than 0.3 g. Each set of 15 filter papers shall be conditioned at a relative humidity of 55 % ± 5 % and at a temperature of 23 °C ± 3 °C for at least 8 hours.

6.5.3 For ASTM E2187 using stainless steel/filter paper substrate, the conditioned filter papers shall be 26.2 g ± 0.5 g and the standard deviation of the five sample weights shall be no more than 0.3 g. Each set of 15 filter papers shall be conditioned at a relative humidity of 55 % ± 5 % and at a temperature of 23 °C ± 3 °C for at least 8 hours.

6.5.4 The mean mass of the dried filter papers shall be 24.7 g ± 0.5 g. Each set of 15 filter papers shall have been stored at 60 °C ± 2 °C for at least 16 hours, placed in a sealed plastic bag upon removal from the oven, cooled to 23 °C ± 3 °C, and weighed within 3 minutes of opening the bag. The standard deviation of the five sample weights shall be no more than 0.3 g.

6.5.5 For ASTM E2187 using stainless steel/filter paper substrate, the mean mass of the dried filter papers shall be 24.9 g ± 0.7 g. Each set of 15 filter papers shall have been stored at 60 °C ± 2 °C for at least 16 hours, placed in a sealed plastic bag upon removal from the oven, cooled to 23 °C ± 3 °C, and weighed within 3 minutes of opening the bag. The standard deviation of the five sample weights shall be no more than 0.3 g.

6.5.6 In addition, for ASTM E2187 using stainless steel/filter paper substrate, the moisture content of the conditioned paper, relative to the dried paper, shall be 5.0 % ± 0.6 % by mass.

6.6 Verification of the flatness of the stainless steel plates (only for ASTM E2187)

6.6.1 Ensure that the stainless steel plates are sufficiently flat by placing the steel sheet concave downward on a granite surface plate that is flat. The sheet is not sufficiently flat if a 2 mm diameter precision ground steel rod, in contact with the flat surface, can be inserted between the sheet and the flat surface.

6.7 Conditioning

6.7.1 Cigarettes

6.7.1.1 Place the cups in the environmental chamber at a relative humidity of 55 % ± 5 % and a temperature of 23 °C ± 3 °C at least 24h prior to testing.

6.7.2 Filter papers

6.7.2.1 Sets of 15 filter papers need to be conditioned at 55 % ± 5 % and 23 °C ± 3 °C and be placed beside each other. The filter papers shall be on a flat horizontal surface with at least 4 mm vertical spacing above each set to enable free access of air to the specimens

6.7.2.2 In addition to the requirements listed below, a week prior to testing, place an open box of filter papers with the lid removed inside the environmental chamber in case extra filter papers are required.

Table 1: Conditioning Requirements

	ISO 12863	ASTM E2187
8 h of conditioning	40 sets of 10 filter papers	40 sets of 1 filter paper

6.7.3 Stainless steel plates (ASTM E2187 only)

6.7.3.1 Condition each individual plate at a temperature of 23 °C ± 3 °C for at least 2 hours prior to testing.

6.8 Testing

6.8.1 Turn on the exhaust system approximately 30 minutes prior to testing.

6.8.2 Place the covers on the chimneys.

6.8.3 Turn on the aspirator for the ignition system.

6.8.4 Immediately before testing, remove the required number of filter papers from the environmental chamber. Remove only 2 sets of filter paper(s) at a time and ensure that testing is complete within 5 minutes.

6.8.4.1 ISO 12863: place 10 filter papers on the substrate holder, rough side up, and place the thinnest brass rim on top. Refer to Figure 3.

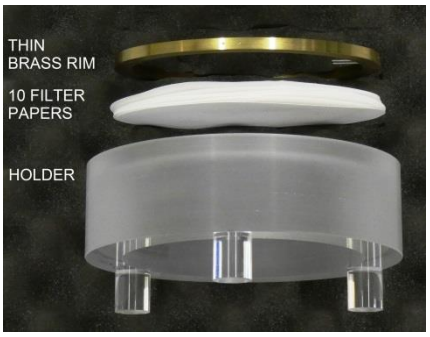

Figure 3 ISO 12863 substrate

6.8.4.2 ASTM E2187: start by placing the adapter ring on the substrate holder followed by the steel plate concave side down followed by one filter paper rough side up and place the thickest brass rim on top. Refer to Figure 4.

Figure 4 ASTM E2187 stainless steel/filter paper substrate

6.8.5 Position the substrate holder in the middle of the test chamber, front foot on the yellow dot (see Figure 5).

6.8.6 Immediately after placing the filter paper(s) on the substrate, remove the required number of cigarettes from the environmental chamber. Remove only 2 cigarettes at one time and ensure that testing has begun within 5 minutes after removal from the environmental chamber.

6.8.7 Without delay, ignite one cigarette by placing it into the ignition system in the horizontal direction and letting it burn to the 5 mm mark.

6.8.7.1 During the burn process, rotate the cigarette to obtain a symmetrical burn.

6.8.8 Holding the cigarette vertically, lit end up, transport the cigarette to the test chamber. Position the cigarette holder in the middle of the test chamber (green dot) and place the lit cigarette in the cigarette holder, paper seam facing up (see Figure 5).

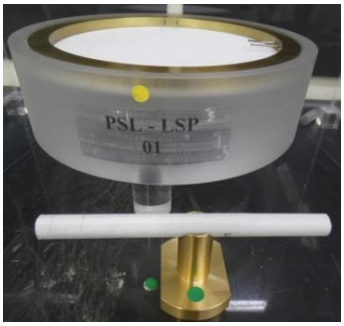

Figure 5 Position of a cigarette on the holder

6.8.9 Simultaneously close the door and remove the chimney cover.

6.8.10 While the first cigarette is burning on the cigarette holder, ignite the second and place it on the cigarette holder of the next test box.

6.8.11 If the cigarette self-extinguishes while in the cigarette holder, terminate the determination and record the result as ''self-extinguished''.

6.8.12 When the cigarette has burned to the 15 mm mark, simultaneously cover the chimney and open the chamber door.

6.8.13 Gently remove the cigarette from the holder and move the cigarette holder to where it will not interfere with the remainder of the test operation (front corner).

6.8.14 Gently lay the cigarette, with the ash still attached, on the filter paper(s) so that the non-ignited end is placed between the anti-roll parallel metal pins of the brass rim.

6.8.14.1 The cigarette paper seam shall be facing up. Refer to Figure 6.

6.8.14.2 If the ash falls off during the transportation or positioning process, retest the other cigarette from the same cup.

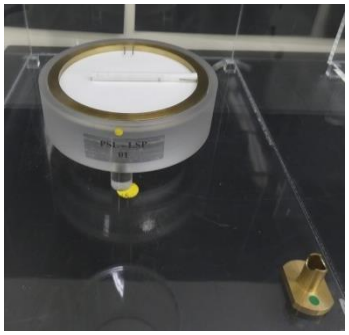

Figure 6 Cigarette on substrate

6.8.15 Without delay, simultaneously gently close the door and remove the chimney cover.

6.8.16 Observe the burning cigarette. The smoke plume near the cigarette shall remain undisturbed.

6.8.16.1 If the smoke plume is disturbed, the test chamber and the exhaust system shall be verified by following section 6.2 of ISO 12863 (Section 8.1.2 of ASTM E2187).

6.8.16.2 If the test box and the exhaust are in accordance with section 6.2 from ISO 12863 (Section 8.1.2 of ASTM E2187), but the sample is still producing a disturbed smoke plume, note this observation on the results of analysis sheet.

6.8.17 Record the following results on the PSL-F26 - Results of Analysis Sheet;

6.8.17.1 Smoke Plume OK,

6.8.17.2 Self-extinguished in holder,

6.8.17.3 Measured Unburnt length,

6.8.17.4 Full Length Burn,

6.8.17.5 Burnt length,

6.8.17.6 Temperature and relative humidty in the environmental chamber,

6.8.17.7 Date and start time of each determination.

6.8.18 After the cigarette has ceased burning, open the test chamber and dispose of the filter paper(s) and cigarette in a safe manner.

6.8.19 If using ASTM E2187, clean every stainless steel plate after each determination by using a clean wipe that has been wetted with isopropanol. Ensure that the stainless steel plate is dry before proceeding with the next determination. Record on the log sheet for Stainless steel plate replicates the date and sample number for each sample tested. The stainless steel plate shall be discarded after 80 tests.

6.8.20 Repeat 6.8.2 to 6.8.2019 for 40 determinations by following the cup order.

6.8.21 Calculate the fraction of 40 determinations in which the cigarettes burned full length.

7 HEALTH AND SAFETY

7.1 Wear personal protective equipment when testing (e.g. Powered Air Purifying Respirator Kit, gloves, lab coat).

7.2 Ensure the extinguisher is within reach if a fire should occur.

8 QUALITY ASSURANCE

8.1 Ensure that the analytical balance, temperature and humidity recorder and thermometers are calibrated.

8.2 Ensure that the ruler, analytical balance and calipers are verified prior to testing.

8.3 Ensure that the environmental chamber is verified and continuously monitored.

8.4 Ensure that the cigarette holder does not clamp the cigarette or stress it in any other manner and does not contact the cigarette within 30 mm of its lit end.

8.5 Ensure test chamber door seals are checked and doors are closed flush against the chamber's side wall and that the latching device secures the door tightly.

8.6 Ensure all construction seams are airtight and that cracks are not visible on any surface of the test chamber.

8.7 Only handle the cigarettes by their last nominal 25 mm of the end that is not to be lit.

8.8 The circular sheets of filter paper shall not be handled in the vicinity where the cigarette will contact the paper during a determination.

8.9 The materials shall only be handled with dry hands or using clean, dry, non-powdered surgical gloves.

9 TEST REPORT

9.1 In addition to the requirement of ISO/IEC 17025, the test report shall include, at a minimum, the following information:

9.1.1 Laboratory name

9.1.2 Reference to the test method used

9.1.3 Date of test

9.1.4 Identification of the product

9.1.5 Description of the sampling procedure, where relevant

9.1.6 Substrate used including the number of layers of filter paper per determination

9.1.7 Fraction of 40 determinations in which the cigarette burned past the front plane of the tipping paper (filter tip cigarettes) or past the tips of the metal pins for non-filter tip cigarettes.

APPENDIX A

SAMPLE TEST REPORT FORMAT

Health Canada
Product Safety Laboratory
1800 Walkley Road, Ottawa, ON K1A 0K9

Report ID: Page 1 of 1

Date sample received:	Sample #:
Date tested:	Date of report:

TEST REPORT

Sample Type: Inspection
Case #: INSQC
Product Brand and Name:
Description: Format of cigarettes:
Units Received:
Barcode:
Manufacturer code:
Client: Terry Olfert (Senior Corporate Regulatory Compliance and Enforcement Advisor, – Tobacco Control Directorate)
Tests Requested: F26: Ignition Propensity of Cigarettes

Test Method: F26: Ignition Propensity of Cigarettes which references:
ISO 12863:2010 Standard Test Method for Assessing the Ignition Propensity of Cigarettes using 10 layers of Whatman #2 filter paper per determination

Sample

Picture

Sample #

Results:

Test method	Fraction of cigarettes that burned past the front plane of the tipping paper	Percentage of cigarettes that burned past the front plane of the tipping paper (%)
ISO 12863:2010	/40	

Signatures

Tested by Analyst(s):	Reviewed by Analyst(s):

Reviewed/Approved by Section Head:

Disclaimer: The results contained in this report relate only to the item tested. They cannot be used for marketing, advertising or promotional purposes. This report is incomplete without this Disclaimer and the Signatures page.