Reference Manual Book 5: Laboratory Policies and Procedures

Part B: Test Method Section

F08: Cellulose Insulation

1 SCOPE

1.1 This method describes procedures for testing cellulose insulation for compliance with the Cellulose Fibre Insulation Regulations.

1.2 This method consists of the following procedures:

a) Label Review

b) Determination of the Design Density

c) Test for Smoulder Resistance

d) Test for Separation of Chemicals

e) Test for Corrosiveness of Cellulose Insulation

f) Test for Open-Flammability of Cellulose Insulation

2 APPLICABLE DOCUMENTS

2.1 Cellulose Fibre Insulation Regulations SOR/2016-177

2.2 Product Safety Reference Manual: *Book 4 - Flammable Products*

2.3 CAN/ULC-S703-09: *Standard For Cellulose Fibre Insulation For Buildings*

2.4 CAN/ULC-S130:2018: *Standard Method of Test for Ignition Resistance of Loose Fill Insulation (Cigarette Method)*

2.5 ASTM Standard G1-03: Standard Practice for *Preparing, Cleaning, and Evaluating Corrosion Test Specimens*

2.6 ASTM B152/B152M-19: *Standard Specification for Copper Sheet, Strip, Plate and Rolled Bar*

2.7 ASTM B209-14: *Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate*

2.8 Results of analysis or test forms and spreadsheets: PSL-F-08

2.9 PSL-F-Cigarette SRM 1196a checklist

2.10 SOP 20 Verification of Stopwatches and Timers

2.11 SOP 32 Standard Operating Procedure for Operation of the Foster Environmental Chamber

2.12 SOP 45 Standard Operating Procedure for the Cellulose Blowing Machine - Krendl 250A

2.13 SOP 53 Verification of Rulers and Similar Measuring Devices

2.14 SOP 58 Verification of Oven and Freezer Temperatures

2.15 SOP 61 Flammability Verification of Balances

2.16 SOP 66 Critical Radiant Flux (CRF)

2.17 SOP 82: Standard Operating Procedure for New Brunswick Scientific Shaker Innova 2100

3 DEFINITIONS

3.1 See CAN/ULC-S703: *Standard for Cellulose Fibre Insulation for Buildings, Section 3 "Terminology"*

4 LABEL REVIEW

4.1 Test Procedure

Verify whether following information is marked on the product container legibly and in a prominent location:

- name and principal place of business in Canada of the manufacturer or the importer of the product;

- the day, month and year of manufacture for the product.

5 DETERMINATION OF DESIGN DENSITY

5.1 Apparatus and Materials

5.1.1 Sample Containers - Six sample containers made from plywood, three with inside dimensions of approx. 900 mm long by 350 mm wide by 150 mm deep and three with inside dimensions of 450 mm long by 350 mm wide by 300 mm deep.

5.1.2 Depth Gauge - A stainless steel pin, 3 mm in diameter and at least 300 mm long, tapered to a sharp point, equipped with a freely sliding clear acrylic sheet approximately 2 mm thick and 76 mm in diameter.

5.1.3 Blowing Machine - An electric thru-blower pneumatic blowing machine in which the insulation material passes through the impeller chamber of the blower and that is equipped with 30 m of 60 mm diameter corrugated blowing hose. The Air Valve setting of the “thru-blower” depends on the type of application and the length of blowing hose attached to the blower. For the purpose of determining the design density of cellulose insulation in laboratory testing, the air setting of the blower will remain constant throughout the useful life of the blowing machine. Consult SOP 45 for the blower’s air settings, and for the operation and maintenance of the blowing machine.

5.1.4 Balance - A balance that is capable of weighing at least 5 kg to the nearest 1 g.

5.1.5 4 kg mass for verification of balance

5.1.6 Environmental Chamber capable of maintaining a relative humidity (RH) of 50 % ± 5 % and a temperature of 23 °C ± 2 °C.

5.1.7 Mechanical stud scrubber for levelling the cellulose insulation

5.1.8 A verified ruler for measuring the depth of cellulose insulation

5.2 Sample Conditioning

Samples shall be conditioned at 23 °C ± 2 °C and 50 % ± 5 % RH for a minimum of 48 hours prior to testing.

Place the bags of cellulose insulation flat on a shelf inside the environmental chamber. Cut and fold back the packaging of the samples such that the entire contents are exposed to the conditioning environment.

5.3 Test Procedure

5.3.1 Weigh and record the mass of the empty sample containers described in section 5.1.1.

5.3.2 Blow the material into each of the six containers.

5.3.2.1 Pour an approximate equal amount of cellulose insulation from each bag of insulation into the hopper so that there is a sufficient amount of insulation to fill the sample containers. Note: Do not pour all insulation provided into the hopper during this test procedure. Approximately 200 g of unblown material will be required for a subsequent test. The sample containers (three containers of the same size at the same time) shall be located at the same level as the blowing machine on a level floor in front of an operator directing the blowing hose. When blowing, the hose shall be kept approx. 280 mm above the floor surface for the 150 mm deep containers and approx. 430 mm above the floor surface for the 300 mm deep containers. A hose-positioning stand may be used. Place the loose fill insulation into the hopper of the blowing machine. When the insulation is blowing at a steady rate, start filling the container so that the main stream of the material is falling over the rear wall. Slowly move backwards maintaining the height and direction of the flexible hose as specified. Continue filling the containers at an even rate until the material falls over the front wall of the container.

5.3.3 Screed the insulation even with the top of the containers using a flexible straight edge in a fanning motion or using a stud scrubber. Take care not to compact the insulation or leave large voids on the surface of the material. Repeat this procedure for all six containers.

5.3.4 For each container, use the depth gauge to measure and record the thickness of the insulation in five total areas - in the centre of the container and at the centre of each quarter of the container. Calculate the average thickness. While performing this step, caution should be exercised to not disturb the product.

5.3.5 Weigh and record the mass of the filled containers.

5.3.6 From the six containers, evenly distribute the blown insulation into 2 two cubic feet cardboard boxes to be used for smoulder resistance and corrosiveness testing. Mark the boxes with the Sample number and the date the sample was blown.

5.4 Test Results

5.4.1 Calculate the Laboratory Density for each specimen using the following equation:

$$\textbf{Laboratory Density (kg/m}^3\textbf{) = M/V}$$

where:

M = the mass of the specimen in kilograms, and

V = the volume (m^3) of the specimen (calculated by multiplying the internal length of the container by the internal width of the container and by the average thickness of the specimen).

Box 1,2,3 Volume = Average thickness x Length x Width

Box A, B, C Volume = Average thickness x Length x Width

5.4.2 Calculate the Design Density for each specimen using the following equation:

Design Density (kg/m^3) = Laboratory Density x 1.21

5.4.3 Report the test result as the average of the Design Density values for the six specimens, as calculated in section 5.4.2.

6 TEST FOR SMOULDER RESISTANCE

6.1 Test Conditions

6.1.1 The area in which the Test for Smoulder Resistance is to be carried out shall be maintained at 23 °C ± 2 °C and 50 % ± 5% RH and protected from drafts.

6.1.2 Provision should be made to exhaust smoke and toxic gases from the area.

6.1.3 The air speed in the vicinity of the test specimens during the test shall not exceed 0.5 m/s at the start of the test.

6.2 Apparatus and Materials

6.2.1 Specimen Holder - The specimen holder is a water-tight box having inside dimensions of 200 mm by 200 mm by 100 mm deep. It is open at the top and is fabricated from a single sheet of 0.61 mm thick stainless steel with the vertical edges of the box overlapped to an extent no greater than a 7 mm wide seam.

6.2.2 Sleeve - A sleeve of cardboard or other suitable material, approximately 200 mm square and 200 mm high and adjusted to fit snugly against the outer surface of the four sides of the specimen holder.

6.2.3 Hole Centering Jig - A hole centering jig that is a stainless steel tube, 80 mm long and 8.5 mm in diameter, attached to two stainless steel support members and is constructed in accordance with the specifications given in Figure 2 of the CAN/ULC-S130-2018 Standard Method of Test for Ignition Resistance of Loose Fill Insulation (Cigarette Method).

6.2.4 Glass Rod - A glass rod, 500 mm long and 8 mm in diameter, with a flame smoothed pointed end.

6.2.5 Specimen Holder Pad - A rigid glass fibre board, 25 mm thick and having a density of 48 kg/m^3 (thermal resistance: 0.7 RSI) capable of accommodating at least three specimen holders described in section 6.2.1.

6.2.6 Ignition Source - National Institute of Technology (NIST): SRM 1196a Standard Cigarette for Ignition Resistance Testing.

6.2.7 Balance - A balance that is capable of determining the mass of up to 1 kg to the nearest 0.2 g or better.

6.2.8 Environmental Chamber - A conditioning facility that is capable of maintaining a temperature of 23 °C ± 2 °C and RH of 50 % ± 5 %.

6.2.9 Hot Wire Anemometer - A device that is capable of measuring an air speed equal to or less than 0.5 m/s to the nearest 0.01 m/s.

6.3 Preparation of Test Specimens

6.3.1 Prepare a product by combining roughly equal amounts of blown cellulose from the six containers used for the determination of Design Density. The combined product shall be used for the Smoulder Resistance Test.

6.3.2 Weigh and record the mass (to the nearest 0.2 g) of a clean, dry specimen holder described in section 6.2.1.

6.3.3 Attach the specified sleeve to the specimen holder, so that the combined height of the specimen holder and sleeve is 200 mm.

6.3.4 Determine the mass of the product that, when packed in the specimen holder filled to its brim, would yield a test specimen at a density which is equal to the Design Density of the sample.

6.3.5 Weigh the determined amount of the product (to the nearest 0.2 g) and pour it evenly into the specimen holder with the attached sleeve, as prepared in section 6.3.3.

6.3.6 If the material projects above the top edge of the specimen holder, drop the holder from a suitable height (100 mm to 150 mm, depending on the volume of the specimen), in such a manner that the base of the holder lands flat on a hard surface. Continue to drop the holder in the indicated manner until the specimen surface is flush with the top edge of the specimen holder. Remove the sleeve from the specimen holder.

6.3.7 Fill two more specimen holders in the same manner.

6.4 TEST PROCEDURE

6.4.1 Condition the three prepared specimens in their holders and three specified cigarettes at a temperature of 23 °C ± 2 °C and at a RH of 50 % ± 5 % for at least 48 hours prior to testing.

6.4.2 Determine the mass (to the nearest 0.2 g) of each of the filled specimen holders.

6.4.3 Place the specimen holders on the specified specimen holder pad in the test area so that the distance between the holder and any adjacent vertical surface is at least 100 mm.

6.4.4 Place the hole centering jig on each specimen holder and pass the glass rod through the stainless steel tube until it reaches the bottom of the holder making a vertical hole approximately 8 mm in diameter and at least 80 mm deep, in the specimen.

6.4.5 Mark each conditioned cigarette at a distance of 80 mm from one end of the cigarette.

6.4.6 Record three air speed readings in the test area using the anemometer. Ensure that the average of these three readings is ≤ 0.5 m/s before proceeding.

6.4.7 Light each cigarette at the end nearest to the mark, let it burn to the mark and immediately insert it into the hole in each of the specimens with the lit end up.

6.4.8 Push down each cigarette gently with the flat end of a small spatula until the tip of the cigarette is flush with the specimen surface, making sure that the tip of the cigarette is in contact with the specimen.

6.4.9 Allow the burning of the cigarettes and specimens to continue undisturbed for:

a) 2 hours; or,

b) the period required for smouldering combustion to cease;

whichever is the longer period.

6.4.10 Let the specimens in their holders cool to the ambient temperature of the test area.

6.4.11 Determine the mass of each specimen holder along with the residue of the specimen to the nearest 0.2 g.

6.5 Test results

6.5.1 Calculate the percentage of mass loss for each of the three specimens by using the following equation:

$$\text{Mass Loss (\%)} = \frac{W_1 - W_2}{W_1 - W_0} \times 100$$

where:

W_0 = mass (g) of empty specimen holder;

W_1 = mass (g) of specimen holder and specimen after conditioning; and

W_2 = mass (g) of specimen holder and residue after completion of the test.

6.5.2 Report the percent mass loss for each of the three specimens and any flaming combustion, if any.

7 TEST FOR SEPARATION OF CHEMICALS

7.1 Apparatus

7.1.1 Glass Jar (capacity: 4 L), approx. 230 mm high and 150 mm in diameter with a lid;

7.1.2 Shaker Apparatus - Digital Platform Shaker Model # Innova 2100 manufactured by New Brunswick Scientific Co. Inc. The apparatus should be capable of shaking the jars in a circular orbit in the horizontal plane at a frequency of 275 ± 5 cycles/minute.

7.1.3 Analytical Balance - A balance capable of measuring to the nearest 0.1 g.

7.1.4 Timer - A timer capable of measuring to the nearest 0.1 hour.

7.2 Test Procedure

7.2.1 Remove 200 g of unblown material from the top, middle and bottom of the original sample. Place the material in a single container and mix by hand to create a uniform composition.

7.2.2 Weigh the empty glass jar to an accuracy of 0.1 g.

7.2.3 Remove approximately 100 g of the unblown test sample from the container and place it in the glass jar. Reweigh the jar to the nearest 0.1 g. Repeat the procedure for one more specimen.

7.2.4 Place the lid on the jar and shake for 30 minutes at a frequency of 275 ± 5 cycles/minute.

7.2.5 After shaking, remove the cellulose insulation from the jars and determine the mass of non-cellulosic deposits remaining behind; record to the nearest 0.1 g.

7.3 Test Results

7.3.1 Use the following equation to calculate the percentage, by mass, of non-cellulosic components which have separated from each of the two specimens.

$$\textbf{Separated Chemicals (\%)} = C_2/C_1 \times 100$$

where:

C_2 = mass (g) of the separated non-cellulosic components
C_1 = mass (g) of the specimen

7.3.2 Report the results obtained for the two specimens.

8 CORROSIVENESS TEST

8.1 Apparatus and Materials

8.1.1 Oven capable of maintaining a temperature of 50 °C ± 2 °C.

8.1.2 Six small containers approximately 90 mm long by 90 mm wide by 50 mm deep made of an inert material such as polypropylene and equipped with a tight fitting lid.

8.1.3 Six large containers equipped with an airtight lid and capable of housing the smaller containers while still fitting inside the oven.

8.1.4 Metal coupons, free of corrosion, tears, punctures or crimps, of approximately 50 mm by 50 mm having a uniform thickness of 0.076 mm as described below:

(I) ASTM B209, type 3003 bare aluminium, soft temper;

(ii) ASTM B152, type ETP, Cabra N. 110, soft copper;

(iii) Low carbon, commercial quality, cold rolled, shim steel.

8.1.5 Chrome-reflected 40 W appliance light bulb.

8.1.6 Balance capable of determining the mass to the nearest 1 g.

8.1.7 Isopropyl alcohol used as a degreaser.

8.1.8 Cleaning agents:

Aluminium	50 ml phosphoric acid (H_3PO_4 sp.gr. 1.69) 20 g chromium trioxide (CrO_3) Distilled water to make 1000 ml
Copper:	500 ml hydrochloric acid (HCl sp.gr. 1.19) Distilled water to make 1000 ml
Steel:	20 g antimony trioxide (Sb_2O_3) 50 g stannous chloride ($SnCl_2$) 1 L hydrochloric acid (HCl sp.gr. 1.19)

Note: All chemicals shall be of reagent grade or better.

8.1.9 Distilled or deionized water.

8.2 Test Procedure

8.2.1 Select two coupons of each metal as specified in Subsection 8.1.4.

8.2.2 Use plyers, tongs or a similar instrument to grasp the coupons. Degrease the coupons using isopropyl alcohol and rinse with distilled or deionized water to remove any residue.

8.2.3 For each metal coupon to be tested, weigh 20 g ± 2 g of blown cellulose insulation, then saturate it by stirring in150 ml ± 5 ml of freshly boiled and cooled distilled or deionized water at room temperature.

8.2.4 Place approximately half of the saturated insulation into the small container and tamp it until the surface is level.

8.2.5 Place the metal coupon (one coupon per container) onto the centre of the insulation surface.

8.2.6 Cover the coupon evenly with the remainder of the saturated insulation and tamp the surface to assure good contact with the metal coupon. Seal the container.

8.2.7 Identify the small container with the Sample # and the type of coupon.

8.2.8 Place the small container in the large container and add sufficient distilled or deionized water to the large container so that the small container is slightly buoyant. Place the lid on the large container, ensuring that there is a good seal.

8.2.9 Place the assembly on a level shelf in an oven at 50 °C ± 2 °C for 28 days.

8.2.10 Upon completion of the test, remove the assembly from the oven and dismantle. If the large container does not have any water remaining in it, the entire test must be repeated.

8.2.11 Grasp the coupons using plyers, tongs or a similar instrument and remove the corrosion products from the metal coupons using the cleaning agents specified in ASTM G1-03 Procedure C2.1 (copper), Procedure C3.1 (steel) and Procedure C1.1 (aluminium) with the aid of a non-metallic abrasive scouring pad or similar device. Rinse all metal coupons in distilled or deionized water and dry at room temperature.

8.2.12 Examine the aluminium, copper and steel coupons for perforations in a darkened room over a chrome reflected 40 W appliance light bulb. Record any perforations.

9 OPEN-FLAMMABILITY TEST

Apparatus

9.1 Small Scale Electric Radiant Panel meeting the requirements and constructed as outlined in section 6.3.9.2.1 ***A to W*** of CAN/ULC-S703-09 standard for cellulose fibre insulation.

9.1.1 Heat Flux Transducer calibrated over the operating flux level range from 0.0 W/cm^2 to 1.9 W/cm^2 with a sensitivity of 0.001 W/cm^2.

9.1.2 Heat Flux Meter capable of measuring the output of the total heat flux transducer during the flux profile determination and displaying in W/cm^2 units.

9.1.3 Regulated constant-voltage transformer capable of maintaining the voltage to within ± 4 % of the setting.

9.1.4 Constant Temperature Bath/Circulator maintained at a temperature of 23 °C ± 2 °C with an attached flow meter capable of water circulation at a rate of approximately 500 ml/min.

9.1.5 Stopwatch capable of measuring to the nearest 1 s.

9.1.6 Six specimen trays constructed from 22 gauge - 26 gauge (thickness of approx. 0.6 mm) heat resistant stainless steel. The trays shall be 610 mm ± 5 mm long by 152 mm ± 2 mm wide by 51 mm ± 1 mm deep.

9.1.7 Dummy specimen made from 6 mm calcium silicate board 610 mm ± 5 mm long by 152 mm ± 2 mm wide by 51 ±1 mm thick. The dummy specimen shall have 27 mm diameter holes along the centre line at 100 mm, 200 mm, 300 mm, 400 mm, and 500 mm locations.

9.1.8 Lighter with long neck (i.e. utility lighter) or matches.

9.1.9 Metal ruler for screeding the specimen surface.

9.1.10 Verified transparent ruler at least 60 cm to measure burn length to the nearest 0.5 cm.

9.1.11 Thru-Blower type electric blowing machine for specimen preparation.

9.1.12 Environmental Chamber - A conditioning facility that is capable of maintaining a temperature of 23 °C ± 2 °C and RH of 50 % ± 5%.

9.2 Sample Preparation

9.2.1 With the specimen trays resting on a level surface, uniformly blow cellulose insulation into 6 specimen trays using a blowing machine; use the same settings as those used for the determination of the design density. (See section 5 of this method).

9.2.2 Ensure that the cellulose material fills the tray evenly and sits slightly above the top of the tray. Grasping both ends of the tray and being careful to avoid touching the cellulose insulation, shake the tray gently in a back and forward motion so that the top surface of the insulation is uniformly level and slightly above the top of the specimen tray.

9.2.3 Drop the tray gently three times from a height of 5 cm to 10 cm in such a manner that the base of the tray lands squarely on a hard flat surface.

9.2.4 Screed the insulation level with the surface of the specimen tray using a metal ruler in a fanning motion.

9.2.5 Repeat steps 9.2.2 to 9.2.4 with the remaining 5 specimen trays.

9.2.6 Keep each specimen tray in the environmental chamber (Temperature 23 °C ± 2 °C and 50 % ± 5 % RH) for a minimum of 48 hours and allow no more than 10 minutes in conditions different from the above prior to testing.

9.3 Procedure for Establishing Radiant Energy Flux Profile

9.3.1 Prior to calibration, allow the test chamber to equilibrate to 50 °C ± 2 °C

9.3.2 Consult SOP 66 for the operation and calibration of the Critical Radiant flux apparatus.

9.4 Test Procedure

9.4.1 Open the door and slide the filled specimen tray into the apparatus until it is seated against the back of the unit; close the door and start the stopwatch.

9.4.2 After pre-heating the specimen for 180 s ± 5 s, slightly raise the door to ignite the specimen using a utility lighter or match and immediately lower the door.

9.4.3 When all flaming has ceased, open the door and remove the specimen tray.

9.4.4 Measure the burn length of the specimen. Record the measurement to the nearest 0.5 cm.

9.4.5 Repeat steps 9.4.1 to 9.4.4 for two other specimens.

9.4.6 Use Excel worksheet PSL-F-08 Results of Analysis to determine the corresponding value (to two decimal places) of the Critical Radiant Flux for each specimen from the calibration curve.

9.4.7 If the Critical Radiant Flux for at least two of the three specimens is less than 0.12 W/cm^2, no further testing is required. If the Critical Radiant Flux for only one of the three specimens is less than 0.12 W/cm^2, test 3 additional specimens following steps 9.4.1 to 9.4.6.

9.4.8 Include a printout of the “regression for calibration” and the “calibration curve” tabs from PSL-F-08 Results of Analysis in the sample folder.

10 HEALTH AND SAFETY

10.1 During the blowing process, samples may produce a large amount of dust and small particles. The following protective measures should be taken:

10.1.1 Wear coveralls and gloves to protect skin and clothing.

10.1.2 Wear a face dust mask with a breathing unit that filters out the particulate matter to protect the respiratory system.

10.2 For the flammability tests (Test for Smoulder Resistance and the Open- Flammability Test,) the following protective measures should be taken:

10.2.1 Wear a lab coat to protect skin and clothing.

10.2.2 Wear lab goggles to protect eyes.

10.2.3 Wear a dust mask or an adequate respirator to protect the respiratory system.

10.2.4 Perform testing in the walk-in fume hood.

10.2.5 The fume hood should be set to “low” during the test (≤ 0.5 m/s).

10.2.6 Light the cigarette using the tubing connected to the fume hood suction nozzle (the aspirator).

10.2.7 Allow all tests to go to completion and the test boxes to cool.

10.2.8 If the specimen(s) starts to produce large amounts of smoke, as determined by the analyst, the fume hood setting may be adjusted to “high” to help clear the smoke.

10.2.9 At the end of the test, place the fume hood on “high” setting, and proceed with

the clean up.

10.3 For the Corrosiveness Test the following protective measures should be taken:

10.3.1 Wear a lab coat to protect skin and clothing.

10.3.2 Wear lab goggles to protect eyes.

11 QUALITY ASSURANCE

11.1 During conditioning and testing, maintain and record temperature and humidity conditions.

11.2 Verify the cigarettes meet the required specifications.

11.2.1 Verification of cigarettes from other projects or test samples is acceptable if the verification was done within 1 year of the current project or test sample.

11.3 Before testing with the CRF apparatus, ensure that the chrome reflector is clean of dust and soot.

11.4 Conduct the testing in a draft free area (air speed less than 0.5 m/s).

11.5 Maintenance of the cellulose blowing machine is done on an as required basis, and performed following SOP 45.

12 TEST REPORT

The test report should contain, at a minimum, the following information:

12.1 Material description, name of the manufacturer, lot number or date code, etc.

12.2 Label Review

12.2.1 Whether the labelling on the containers of the product contains the name and address of the manufacturer or importer of the product and the manufacturing date of the product.

12.3 Test for Smoulder Resistance

12.3.1 The Mass Loss, as a percentage to one decimal place, for each specimen (and evidence of any flaming combustion)

12.3.2 Picture of smoulder test box showing specimen not meeting requirements

12.3.3 The average design density of the specimens.

12.4 Test for Separation of Chemicals

12.4.1 The percentage (by mass) to one decimal place, of non-cellulosic (chemical) components separated from each of the specimens.

12.5 Corrosiveness Test

12.5.1 Any perforations observed in any of the copper, aluminum and steel test coupons.

12.5.2 Picture of any coupon showing perforations

12.6 Open-Flammability Test

12.6.1 Critical Radiant Flux of each specimen.

12.6.2 Picture of each specimen tray not meeting requirements

APPENDIX A

SAMPLE TEST REPORT FORMAT

Test Method: Method F08: Cellulose Insulation (effective 20XX-XX-XX)

(Insert photograph of sample)

Results:

1) Label Review

Insert image of address label

Insert image of date label

1) Smoulder Resistance

Specimen	Mass Loss (%)	Flaming Combustion	
		Yes	No
1	0.3		√
2	0.3		√
3	0.3		√

Average Design Density: _____ kg/m^3

2) Separation of Chemicals

Specimen	Non-cellulosic components separated (%)
1	0.0
2	0.0

3) Open Flammability

Cellulose Specimen Tray	Critical Radiant Flux Result (W/cm^2)
1	0.04
2	0.04
3	0.04

4) Corrosiveness

Aluminium		Copper		Steel	
Coupon 1	Coupon 2	Coupon 1	Coupon 2	Coupon 1	Coupon 2
No perforations present	No perforations present	No perforations present	No perforations present	Perforations present	No perforations present

Insert image of metal coupon with perforations