1 SCOPE

1.1 This method describes procedures for testing cellulose insulation for compliance with the **Hazardous Products (Cellulose Insulation) Regulations** and is applicable to item 35 of Part II of Schedule I to the Hazardous Products Act (HPA).

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 and
e) Test for Corrosiveness of cellulose insulation.

1.3 This method is provided to facilitate laboratory procedures only. It is the trader's responsibility to ensure that the product is tested according to, and meets the requirements of, the HPA and its Regulations.

2 APPLICABLE DOCUMENTS

2.1 Hazardous Products (Cellulose Insulation) Regulations

2.2 CGSB Standard 51-GP-60M*: Thermal Insulation, Cellulose Fiber, Loose Fill*, published in April 1979 as amended in September 1980

2.3 ASTM Standard G1: *Preparing, Cleaning, and Evaluating Corrosion Test Specimens*

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

3 DEFINITIONS

3.1 *Applied Density* - The average applied density is the blown or poured density of the insulation material determined by the procedure specified in sections 5.2, 5.3 and 5.4.

3.2 *Design Density* - Design Density is the calculated value representing the density to which the cellulose insulation will settle over time in an attic or a wall. It is calculated as specified in section 5.5.2.

4 LABEL REVIEW

4.1 Test Procedure

Verify whether the container of the product has a label that displays in a clearly visible and legible manner the following information:

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

- the manufacturing date of 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 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, 3.2 mm thick and 75 mm in diameter.

5.1.3 Blowing Machine - A blowing machine that has an adjustable air setting control and an agitator in its hopper and that is equipped with 30 m of 50 mm diameter corrugated blowing hose.

5.1.4 Balance - A balance that is capable of weighing at least 5 kg with a precision no more than 1 g.

5.1.5 Protective Clothing

5.2 Sample Preparation for Blowing Applications

5.2.1 Selecting the Air Settings

The air setting of the blowing machine shall be selected by conducting a series of tests with a given machine. A minimum of four air settings shall be used. Widely different air settings shall be used first. The lowest setting should be that which will give a uniform flow of material and the highest that which will not produce excessive dust. Two intermediate air settings shall then be used.

In order to determine the air setting for the actual test, fill one container in the manner described in the next section at the four specified air settings. Record the mass of the

container with the blown cellulose at each of the air settings and select the setting that produced the cellulose with the lowest mass.

5.2.2 Procedure

The sample containers 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 pointed 10° upwards and the end of the hose shall be kept 280 mm above the floor surface for the 150 mm deep containers and 430 mm above the floor surface for the 300 mm deep containers. 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 container at an even rate until the material falls over the front wall of the container. Fan the air with a piece of rigid board to blow the insulation away until it is just level with the top of the container, taking care not to compact the insulation or leave large voids in the surface of the material.

5.3 Sample Preparation for Pouring Applications

Pour three or four bags of loose fill insulation into a simulated attic space. The attic space shall be formed by four, 2400 mm by 38 mm by 140 mm, joists placed 400 mm on centre with plywood nailed to the ends and bottom. Fluff the material with a 500 mm wide garden rake, applying a series of small amplitude strokes while moving the rake slowly along the joist. Repeat the fluffing process six times and, then with a shovel, place the insulation material into the sample containers.

5.4 Test Procedure

5.4.1 Determine the mass of the empty sample containers described in section 5.1.1.

5.4.2 Blow or pour the material as specified in the sample preparation into each of the six containers.

5.4.3 For each container: using the depth gauge, measure the thickness of the insulation in the centre of the container and make four additional measurements at the centre of each quarter of the container and calculate the average thickness.

5.4.4 Determine the mass of the specimen in each container.

5.5 Test Results

5.5.1 Calculate the Applied Density for each specimen using the following equation,

Applied Density (kg/m^3) = 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 the container by the internal width of the container and by the average thickness of the specimen).

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

Design Density (kg/m^3) = Applied Density x 1.27

5.5.3 Report the test result as the average of the Design Density values for the six specimens, as calculated in section 5.5.2.

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 ± 2°C and 50 ± 5% relative humidity 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 velocity in the vicinity of the test specimens during the test shall not exceed 0.5 m/s.

6.2 Apparatus and Materials

6.2.1 Specimen Holder - The specimen holder is a watertight 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 1.

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 to accommodate at least three specimen holders described in section 6.2.1.

6.2.6 Ignition Source - The ignition source is a filterless cigarette which is 84 mm long, has a density of 0.27 g/cm^2 and a mass of 1.1 g and is made from natural tobacco.

6.2.6.1 Requirement for Ignition Source - The cigarettes specified in 6.2.6 shall be such that after having been conditioned at 21 ± 2°C and 35-50% relative humidity, when a cigarette is ignited at one end and subsequently placed horizontally on a piece of
55 g/m^2 bonded glass fibre fabric, it burns its entire length in 1500 ± 100 seconds.

6.2.7 Balance - A balance that is capable of weighing at least 1 kg with a precision of 0.1 g.

6.2.8 Conditioning Facility - A conditioning facility that is capable of maintaining a temperature of 23 ± 2°C and relative humidity of 50 ± 5%.

6.2.9 Hot Wire Anemometer - A device that is capable of measuring an air velocity of 0.5±0.01 m/s.

6.3 Preparation of Test Specimens

6.3.1 The product obtained by combining the contents of the six containers, which were used for the determination of Design Density, shall be used for the Smoulder Resistance Test.

6.3.2 Determine the mass (to the nearest 0.1 g) of a clean and dry specimen holder described in section 6.2.1.

6.3.3 Attach the specified sleeve to the weighed specimen holder, using masking tape on the outside of the assembly along the sleeve-holder interface, so that the height of the specimen holder - sleeve combination is 200 mm.

6.3.4 Determine the mass of the product that, when packed in the specimen holder to fill the latter 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 0.1 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 specimen projects above the brim of the specimen holder then drop the latter, from a suitable height (10 to 100 cm, depending on the bulk 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 its brim.

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 ± 2°C and at a relative humidity of 50 ± 5% for at least 12 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 into each specimen making a vertical hole, 8 mm in diameter and at least 8 cm 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 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.

6.4.7 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.

6.4.8 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.

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

6.4.10 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 of empty specimen holder;
W_1 = mass of specimen holder and specimen after conditioning; and
W_2 = mass of specimen holder and residue after completion of the test.

6.5.2 Report the percent mass losses for each of the three specimens.

7 TEST FOR SEPARATION OF CHEMICALS

7.1 Apparatus

7.1.1 Glass Jar (capacity: 4 L), 230 mm high and 150 mm in diameter;

7.1.2 Shaker Apparatus - An apparatus capable of shaking the jars in a circular orbit in the horizontal plane at a frequency of 275 cycles/minute (*Note 1*).

7.1.3 Analytical Balance - A balance with a precision of no more than 0.1 mg;

7.1.4 Timer - A timer with a precision of no more than 0.1 seconds.

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1 Portable Gyrotory Shaker - Model G2 45-400RPM, $^3/_4''$ orbital path has been found satisfactory.

Manufactured by Brunswick Scientific Co. Inc. Edison, New Jersey.

7.2 Test Procedure

7.2.1 Determine the mass of approximately 100 g of the test sample with a precision of 0.1 g.

7.2.2 Repeat the procedure for one more specimen. Place the two specimens in the specified jars and shake for 30 minutes at a frequency of 275 cycles/minute.

7.2.3 Remove the cellulose insulation from the jars and determine the mass of non-cellulosic deposits remaining behind, to the nearest 0.1 g.

7.3 Test Results

7.3.1 Calculate the percentage, by mass, of non-cellulosic components, which have separated from each of the two specimens, using the following equation,

Separated Chemicals (%) = A/M x 100

where:

A = mass (g) of the separated non-cellulosic components
M = mass (g) of the specimen

7.3.2 Report the results obtained for the two specimens.

8 CORROSIVENESS TEST

This section of the method is under development and will be added in a revised issue.

9 QUALITY ASSURANCE / QUALITY CONTROL

9.1 The specifications of the cigarettes have to be checked as per Test Method F-00, “General Information for Flammability Test Methods”.

9.2 The quality control section of the method is under development and will be added in a revised issue when completed.

10 TEST REPORT

The test report should contain the following information:

10.1 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.

10.2 The determined Design Density (kg/m^3) of the product, reported to one decimal point.

10.3 The Mass Loss, as a percentage to one decimal point, for each specimen during the Test for Smoulder Resistance.

10.4 The percentage to one decimal point, by mass, of chemicals having separated for each specimen during the Test for Separation of Chemicals.

11 PRECISION AND BIAS

11.1 Precision - This section of the test method is under development and will be added in a revised issue when completed.

11.2 Bias - No justifiable statement can be made on the bias of this test method since there is no accepted referee test method for cellulose insulation.

12 SAMPLING

Four to five thirty-pound bags are usually sufficient to perform all the tests.

APPENDIX

Standard Report Format

1. Label Review

The container of the cellulose insulation was [not] labelled with the name and address of the manufacturer/importer and the date of manufacture.

2. Smoulder Resistance Test

Specimen	Mass Loss (%)
1	1.3
2	2.5
3	0.9

Design Density: XX.X kg/m^3

3. Test for Separation of Chemicals

Specimen	Chemicals Separated (%)
1	0
2	0

Figure 1. Hole Centering Jig