§ 1209.7 Test procedures for smoldering combustion.

This section provides the test method for determining smoldering combustion characteristics of materials used for thermal insulation. This test shall be conducted on materials at the measured settled density as provided in §1209.4.

(a) Apparatus. (1) The specimen holder shall be an open-top 20 cm × 20 cm × 10 cm (7.87 × 7.87 × 3.94 in) square box, 10 cm × 0.1 cm × 0.2 cm (3.94 ± 0.08 in) in height, fabricated from a single piece of 0.61 ± 0.08 mm thick (24 U.S. Standard gauge) stainless steel sheet with the vertical edges of the box overlapped, not to exceed 7 mm (.28 in) in seam width, and soldered so as to be watertight. A removable extension top extending 8 ± 5 cm. above the top of the smolder box shall also be provided. The specimen holder during test use shall rest upon a pad of unfaced glass fiberboard or equivalent having dimensions equal to or greater than those of the bottom of the specimen holder. The unfaced glass fiberboard shall be approximately 2.5 cm (1 in) thick with a thermal conductivity of 0.30 ± 0.05 cal(g)/hr cm°C/cm (0.24 ± 0.04 Btu/hr ft°F/in) at 23.9 °C (75 °F).

(2) Ignition source. The ignition source shall be a cigarette without filter tip made from natural tobacco, 85 ± 2 mm (3.35 ± 0.08 in) long with a tobacco packing density of 0.270 ± 0.020 g/cm³ (16.9 ± 1.25 lb/ft³) and a total weight of 1.1 ± 0.1 gm (0.039 ± 0.004 oz).
(3) Balance. A balance of 1 kg (2.2 lb) capacity, accurate at least to 0.1 g (0.004 oz), is required.

(4) Test area. The test area shall be draft-protected and equipped with a suitable system for exhausting smoke and/or noxious gases produced by testing. Air velocities as measured by a hot wire anemometer in the vicinity of the surface of the specimen shall not exceed 0.5 m/sec (1.64 ft/sec). The test area shall be at 21±3 °C (69.8±5.4 °F) and 50±5 percent relative humidity at the time the test begins.

(b) Test procedure. (1) Specimens and cigarettes shall be conditioned in air at a temperature of 21±3 °C (69.8±5.4 °F) and a relative humidity of 50±5 percent to equilibrium prior to test. A change of less than 1% in net weight of the specimen in two consecutive weighings with two hours between each weighing constitutes equilibrium. Cigarettes shall be removed from any packaging and exposed in a suitable manner to permit free movement of air around them during conditioning. Calculate the weight of material necessary to fill the holder (volume 4,000 cm³ or 0.14 ft³) at the settled density as determined in §1209.4(e). The material shall be blown, combed, or otherwise mixed to remove lumps and shall be loaded uniformly into each specimen holder, level and flush to the top of the holder. The weight of each specimen shall be measured to the nearest 0.2 g (0.007 oz) or less by weighing the holder before and after filling. If the weight of the specimen is less than that calculated, a removable extension top shall be placed on top of the holder, the necessary amount of insulation is placed inside the extension and the loaded holder shall be dropped from a height no greater than 7.6 cm (3 in) onto a hard flat surface. This process shall be repeated until the calculated weight of material completely fills the holder. The extension top is then removed. With the specimen in the holder and placed on the insulated pad, a rod of 8 mm (.31 in) diameter with a pointed end shall be inserted vertically into the approximate center of the material being tested and withdrawn to form an appropriate cavity for the ignition source, such that the cigarette fits snugly and maintains uniform contact with the specimen. A well lit cigarette, burned not more than 8 mm (0.31 in), shall be inserted in the formed cavity, with the lit end upward and flush with the specimen surface. Burning of the cigarette and specimen shall be allowed to proceed undisturbed in the test area for at least 2 hours or until the smoldering is no longer progressing, whichever period is longer.

(2) After completion of burning and after the holder has cooled down to approximately room temperature, the specimen holder with its material residue shall be weighed, at least to the nearest 0.1 g (0.003 oz), and the percent weight loss of the original specimen calculated. The weight of the cigarette residue is ignored in this calculation. (That is, the weight of the cigarette residue is not subtracted from the net weight of the specimen holder’s contents at the conclusion of the test.)

(3) Three specimens per sample shall be tested.

§1209.8 Procedure for calibration of radiation instrumentation.

This procedure is used to calibrate the radiation instruments used in the test procedures for measuring critical radiant flux.

(a) Radiation pyrometer. Calibrate the radiation pyrometer by means of a conventional black body enclosure placed within a furnace and maintained at uniform temperatures of 490, 500, and 510 °C (914, 932, and 950 °F). The black body enclosure may consist of a closed chromel metal cylinder with a small sight hole in one end. Sight the radiation pyrometer upon the opposite end of the cylinder where a thermocouple indicates the black body temperature. Place the thermocouple within a drilled hole and in good thermal contact with the black body. When the black body enclosure has reached the appropriate temperature equilibrium, read the output of the radiation pyrometer. Repeat for each temperature.

(b) Total heat flux meter. The total flux meter shall be calibrated by the National Bureau of Standards, (direct request for such calibration services to the: Radiometric Physics Division, 534, National Bureau of Standards (NBS),