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**Flammability of
Automotive Interior
Materials —
Horizontal Test
Method**

SAE Recommended Practice
Reaffirmed May 1978

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Submitted for Recognition as
an American National Standard

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FLAMMABILITY OF AUTOMOTIVE INTERIOR MATERIALS - HORIZONTAL TEST METHOD

1. **SCOPE:** This method of test is intended for use in the measurement of the burning rate of automotive interior materials as specified by the applicable standard.
2. **APPARATUS REQUIRED:**
 - 2.1 **Burner:** A Tirrill, Bunsen, or equivalent, burner with a gas flow regulating valve and 0.375 in. (9.53 mm) inside diameter tube, so positioned in the cabinet that the center of the end of the specimen shall be directly above the tip of the flame when the specimen is in place.
 - 2.2 **Burner Fuel:** The gas supplied to the burner shall have a flame temperature equivalent to that of natural gas. Recommended 900-1100 BTU/ft³ (3.36×10^7 - 4.13×10^7 J/m³), if so required.
 - 2.3 **Specimen Holder:** Consisting of two identical U-shaped metal frames made from chrome or nickel-plated steel, or other metal that will not corrode.

Dimensions for these frames are shown in Fig. 1. Lines shall be engraved or scribed on both surfaces of each frame located as shown in Fig. 1.

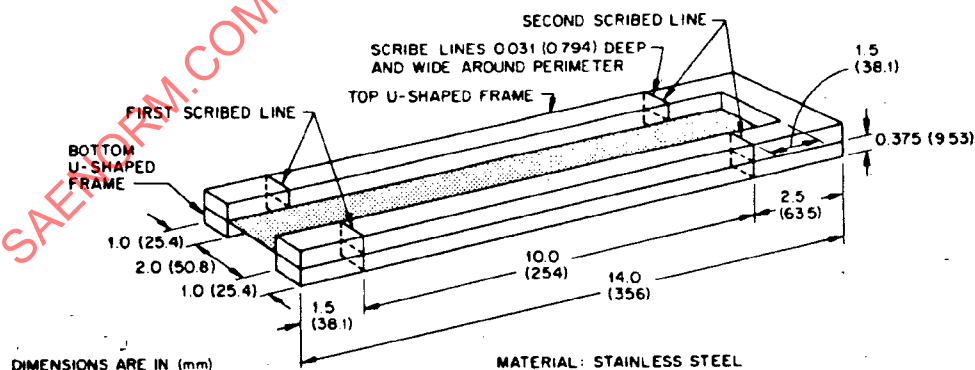


FIG. 1 - SPECIMEN HOLDER, CONSISTING OF TWO IDENTICAL U-SHAPED FRAMES

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- 2.4 Specimen Holder Support: The specimen holder shall be supported horizontally so that the top of the burner is 0.75 in. (19.1 mm) below the top surface of the lower specimen frame.
- 2.5 Metal Cabinet: The cabinet (Fig. 2) for protecting the specimen from drafts shall be fabricated from noncorroding metal and shall be 15 in. (381 mm) long, 8 in. (203 mm) wide, and 14 in. (356 mm) high. It shall have a removable top and a glass observation window in front. For ventilation, the base shall have five 0.75 in. (19.1 mm) diameter holes equally spaced along each side of the cabinet. In addition, there shall be a 0.50 in. (12.7 mm) ventilating clearance running around the perimeter of the cabinet just below the top. At one end of the cabinet there shall be a door to permit insertion of the specimen holder and the specimen. A small hole may be drilled in the cabinet to accommodate the tubing which connects the gas line to the burner. The cabinet shall have 0.375 in. (9.53 mm) risers to permit the circulation of air.

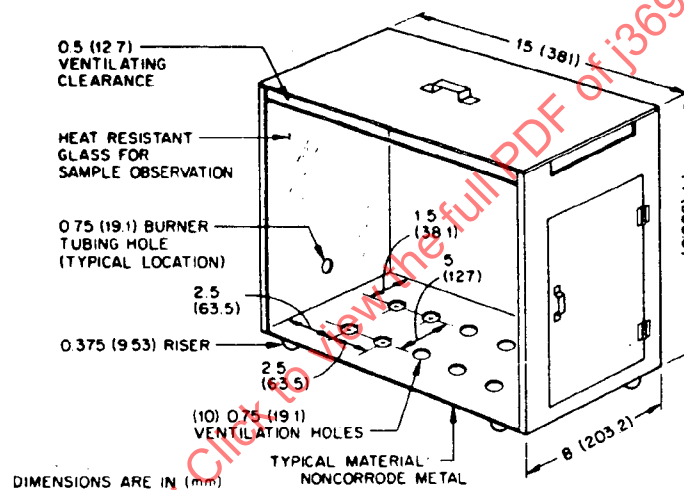


FIG. 2 - HORIZONTAL FLAMMABILITY CABINET

- 2.6 Combing Device: A comb 4 in. (102 mm) wide with 7-8 smooth round teeth per inch (25.4 mm).
- 2.7 Timing Device: A stop watch which will indicate time to 0.1 of a second.
3. TEST SPECIMENS SIZE: In all instances, the largest possible specimen size is to be cut from the material up to the standard specimen size of 4 in. (102 mm) x 14 in. (356 mm) x thickness. The maximum thickness of any specimen shall be 0.50 in. (12.7 mm). If any material to be tested exceeds this, it shall be cut down to a thickness of 0.50 in. (12.7 mm) and shall include the primary surface of the part.

Where the maximum available width of the specimen is 2 in. (50.8 mm) or less so that the sides of the specimen cannot be held in the two matching U-shaped frames, it is to be supported by the use of 0.010 in. (0.254 mm) wires of heat resistance composition spanning the top surface of the bottom U-shaped frame at 1.0 in. (25.4 mm) intervals, as shown in Fig. 3. The U-shaped wire frame shall also be used for a specimen that softens and bends at the flaming end.

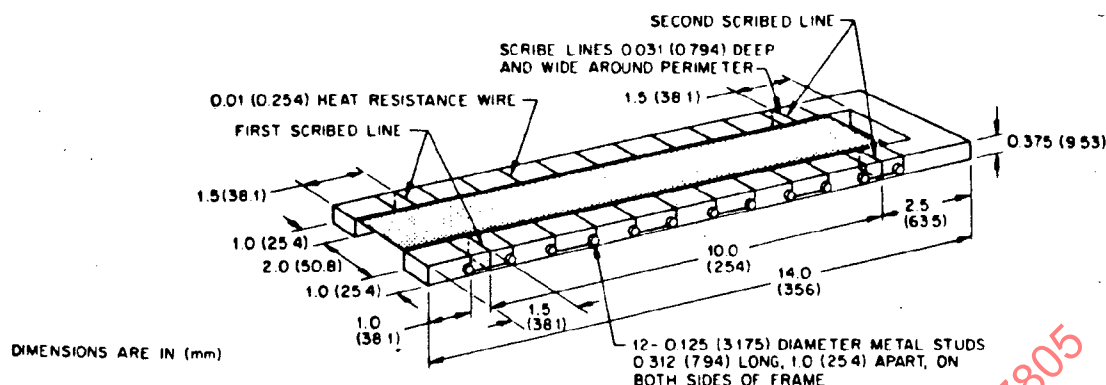


FIG. 3 - BOTTOM U-SHAPED WIRED FRAME (USED FOR SPECIMENS THAT ARE 2 IN (50.8 mm) OR LESS IN WIDTH OR THAT BURN NONUNIFORMLY, USED IN CONJUNCTION WITH EITHER FRAME SHOWN IN FIG. 1

- 3.1 Selection and Direction: Shall be as specified in the applicable standard.
- 3.2 Surface Preparation: When materials to be tested contain either a napped or a tufted-type surface, this test specimen shall be placed on a hard, flat surface and combed twice against the nap prior to testing.
4. TEST PROCEDURE:
 - 4.1 Prior to testing, each specimen is conditioned for 24 h at a temperature of 70 F (21.1 C) and 50% relative humidity or as otherwise specified.
 - 4.2 For convenience, samples may be stored up to 1 h in closed polyethylene bags after conditioning and prior to testing.
 - 4.3 Tests should be conducted with the metal cabinet in a draft-free fume hood to prevent fumes from spreading throughout the room.
 - 4.4 Close the air intake ports on the burner and adjust the gas flow to produce a flame 1.5 in. (38.1 mm) in height.
 - 4.5 Place the mounted specimen in a horizontal position in the center of the cabinet.
 - 4.6 Position the burner so that the center of the barrel will be directly below the center of the open end of the mounted test specimen.
 - 4.7 Expose the specimen to the flame for 15 s, then extinguish the burner flame or remove the burner from the specimen.
 - 4.8 From the time of initial burner flame contact with the specimen, observe for any rapid burning or flame front progression across the top or bottom surface of the material. Begin timing (without reference to the 15 s burner flame application), when the leading flame front reaches the first scribed line 1.5 in. (38.1 mm) from the open end of the U-shaped frame. If the leading flame front progresses more than 2 in. (50.8 mm) beyond the first scribed line at such a rapid rate that it cannot be measured with any degree of accuracy, the material shall be reported as "rapid burning."

- 4.9 Stop timing when the flame is either extinguished or has burned the additional 10 in. (254 mm) to the second engraved line on the specimen holder.
- 4.10 Record time in seconds required for the flame to travel the 10 in. (254 mm) between scribed lines on the specimen holder. Or, record time in seconds and burned length beyond the 1.5 in. (38.1 mm) scribed line if the flame is extinguished before traveling the full 10 in. (254 mm).
- 4.11 Use the following definitions to report complete flammability results as illustrated in Fig. 4.

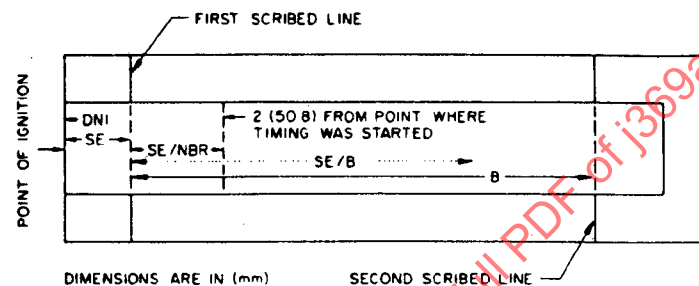


FIG. 4

5. DEFINITIONS:

- 5.1 Does Not Ignite (DNI): The material does not support combustion during or following the 15 s ignition period and does not transmit a flame front across either surface to the first scribed line. (No calculation required.)

Report results as: DNI.

- 5.2 Self-Extinguishing (SE): The material ignites on either surface, but the flame extinguishes itself before reaching the first scribed line. (No calculation required.)

Report results as: SE.

- 5.3 Self-Extinguishing/No Burn Rate (SE/NBR): The material stops burning before it has burned for 60 s from the start of timing, and has not burned more than 2 in. (50.8 mm) from the point where timing was started. (No calculation required.)

Report results as: SE/NBR.

- 5.4 Self-Extinguishing with a Burn Rate in Inches (Millimeters)/Minute (SE/B):
When the leading flame front on either surface progresses beyond the first scribed line, but extinguishes itself before reaching the second scribed line, time and measure its progress to the furthest point where the burning stops and calculate and report the burn rate only if the burner distance exceeds 2 in. (50.8 mm) or the burn time is 60 s or greater.

Report results as: SE/B. Calculate burn rate.

- 5.5 Burn Rate in Inches (Millimeters)/Minute (B): The material burns the full 10 in. (254 mm).

Report results as: B. Calculate burn rate.

- 5.6 Rapid Burning (RB): The material transmits a flame across either surface more than 2 in. (50.8 mm) beyond the first scribed line at a rate too fast to measure accurately; and, therefore, no calculation is required. Examples of materials in this category are extremely thin films which burn rapidly, or napped surfaces which "flash".

Report results as: RB.

6. CALCULATING AND RECORDING: Calculate and record the burn rate for the conditions SE/B (paragraph 5.4) and B (paragraph 5.5) from the formula:

$$B = 60 \times \frac{D}{T}$$

where: B = burn rate, in./min (mm/min) (rounded to one decimal)
D = length the flame travels starting from the first scribed line, in (mm) (rounded to one decimal)
T = time starting from the first scribed line for the flame to travel D, s

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