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SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1361

REAF. AUG94

Issued 1981-04
Reaffirmed 1994-08

Superseding J1361 APR87

Submitted for recognition as an American National Standard

HOT PLATE METHOD FOR EVALUATING HEAT RESISTANCE AND THERMAL INSULATION PROPERTIES OF MATERIALS

***Foreword*—**This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board Format.

1. ***Scope*—**This test method is applicable for rating various materials, such as automotive trim materials and insulation composites, for their ability to resist heat transfer, heat degradation, odor, smoking, and exothermic reaction.

1.1 **Purpose—**The purpose of this testing method is to obtain comparative data which can be used to evaluate heat resistance and thermal insulation properties of various materials or composites when subjected to time and temperature conditions which reflect "in-car" situations.

2. ***References*—**There are no referenced publications specified herein.

3. ***Apparatus and Materials***

3.1 **Hot Plate—**Thermostatically controlled, with a minimum surface area of 525 cm^2 (81 in^2), and capable of maintaining the specified temperature within ±1.5 °C (3 °F).

3.2 **Temperature Probe—**A temperature sensor, which will operate within the desired temperature range, having a maximum diameter of 0.65 mm (0.026 in), a minimum length of 150 mm (6 in), and a maximum error limit of ±2 °C (4 °F).

3.3 **Temperature Indicating Device—**With capacity for multiple channel readings, a maximum error of 0.1 °C (0.2 °F) full scale.

3.4 **Timing Device—**Calibrated in seconds and able to operate for the duration of the test.

3.5 **Shield—**Placed around the hot plate to minimize the effects of drafts.

3.6 **Grid—**An expanded metal grating with diamond-shaped openings. The openings shall have dimensions of approximately 50 x 25 mm (2 x 1 in), and the grating shall have sufficient mass to maintain a loading force of 48 Pa (1 lb/ft^2). (If the mass is insufficient to attain this loading force, weights may be added to each corner of the grid to compensate.) The grid shall be at least as large as the hot plate surface.

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3.7 **Test Materials—**Any necessary materials (such as carpet, burlap, padding, mastic, etc.) that are needed to establish the specific composite.

4. ***Test Specimens and Conditioning—***Cut the materials to be tested to match the dimensions of the hot plate surface. Condition the samples for 24 h at 21 °C ± 1 °C (70 °F ± 2 °F) and 50% ± 5% relative humidity prior to testing (unless otherwise specified).

It is recommended that this test be conducted in the standard laboratory atmosphere as stated previously.

5. ***Procedure***

5.1 Prior to starting the test, the following items must be defined by the individual performing the test for the individual requesting the test:

- **a.** The time versus temperature program for the test. (It should usually simulate actual in-car use and conditions.) This program must detail the following: hot plate temperature at the start of testing, the rate of heating, and the time at maximum temperature conditions.
- **b.** The specific type of material or composite build-up to be used.
- **c.** At what layers the temperature probes will be placed.
- **d.** How often the temperatures will be recorded.

When all items as stated in Section 4 and 5.1 have been satisfactorily met, the actual test can be started by following the procedure listed in 5.2 through 5.6.

5.2 Position at least one temperature probe at the center of the hot plate. If more than one probe is being used, they should be spaced evenly around the surface of the hot plate. If needed, tape can be used to fix the probe to the surface of the hot plate, but should be at least 25 mm (1 in) from the tip of the probe.

5.3 Insert the probes between the layers of the various materials to achieve the required build. Care should be taken to ensure that the probes are approximately above each other.

5.4 When the test setup has been completed, initiate the time versus temperature program desired. (Several of these sequences can be run consecutively, when it is necessary, in order to accurately duplicate in-car conditions.)

5.5 During the test, all temperatures are to be monitored. It is suggested that each temperature be checked at least every 3 min and recorded during the course of the test.

5.6 Run the test until the scheduled time versus temperature program is completed.

6. ***Report—***The following items are to be incorporated into the laboratory report:

6.1 Complete description of the same build-up.

6.2 Time versus temperature program describing how the test was run.

6.3 Time and temperature data (could be in the form of a graph, or a chart from a temperature recorder.)

6.4 Any observations about the material, odor, smoke, specimen degradation, etc., and also the temperatures at which the observations were made.

6.5 Laboratory conditions, temperature, and relative humidity.

6.6 Data, specimen's number of identification, and any further information.

6.7 Conclusion.

PREPARED BY THE SAE ACOUSTICAL MATERIALS COMMITTEE