SURFACE VEHICLE RECOMMENDED PRACTICE

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Superseding J1361 OCT2001

Hot Plate Method for Evaluating Heat Resistance and Thermal Insulation Properties of Materials

RATIONALE

This recommended practice has been revised to include additional test procedure guidance, additional details to be reported such as a visual assessment on the materials exposed on the hot place and additional safety information.

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 under prescribed temperature.

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 Electrical 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 ± 1 °C (2 °F).

3.3 Temperature Indicating Device

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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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

A flattened metal grating with diamond-shaped openings. The openings shall have dimensions of approximately 50 mm x 25 mm (major axis 2 in x minor axis 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.

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. Measure initial thickness and weight. Condition the samples in standard laboratory atmosphere(temperature 21 °C ± 1 °C / 70 °F ± 2 t °F and relative humidity 50% ± 5%) for 24 hours prior to testing (unless otherwise specified).

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

5. PROCEDURE

5.1 Prior to starting the test, the following items must be defined by 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: prescribed temperature, the dwell time at prescribed temperature condition and how often the temperatures will be recorded.

b. The specific type of material or composite build-up to be used

c. At what layers the temperature probes will be placed.

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 5.8.

5.2 Set the sample on the hot plate; place the metal grating on top of the sample. Turn on the hot plate and set up the temperature controller to the prescribed dwell temperature of the test.

5.3 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.

5.4 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.

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

5.6 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, or as requested by the time versus temperature program prescribed.

5.7 During the test, observe any changes in the material under heat exposure. Observe signs of material degradation like, discoloration, loss of material integrity, melting or softening of the material. Multilayer composites may exhibit separation. Observe the presence of smoke, odor, smoldering.

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

6. SAFETY

This method may involve hazardous materials, operations and equipment. It is the responsibility of the users of this method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7. REPORT

The following items are to be incorporated into the laboratory report:

Complete description of the sample build-up. Include information about each of the composite constituents. Report thickness before and after the test, as well as surface weight. If it is a composite multi-layered build-up sample, report thickness and surface weight of each individual layer as well as the total thickness and surface weight of the assembled sample.

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

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

7.3 Any observations about the material, odor, smoke, specimen degradation, melting, layers separation, warping, adherence to the hot surface etc., and also the temperatures and the time at which the observations were made.

7.4 Laboratory conditions, temperature, and relative humidity.

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

7.6 Conclusion.