SURFACE VEHICLE RECOMMENDED PRACTICE

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(R) Compression and Recovery of Insulation Paddings

RATIONALE

SAE J1352 originally contained some basic dry and wet sample methods to measure compression and thickness recovery performance of fibrous materials. Since the original version was issued in 1981, other methods have come into use in various organizations. This revision attempts to incorporate additional in-use methods within SAE J1352 without endorsing any specific method. The user should determine which of the methods is best suited for the specific application.

1. SCOPE

This test method is applicable for determining the relative compression and recovery of fibrous insulation padding materials.

1.1 Purpose

The purpose of this test method is to establish a means of measuring the ability of fibrous insulation materials to resist compression and recover after being compressed, dry or wet. It should be noted that there are several test methods. These methods have been found necessary for different loading applications, variation in surface density of the padding materials and the requirements of different vehicle manufacturers. The results of these test methods cannot be correlated directly to each other. The material specification should indicate which test is necessary for a particular application.

2. REFERENCES

There are no referenced publications specified herein.

3. APPARATUS

3.1 Platen – uniformly thick, flat, rigid plate

3.1.1 Method A: 100 x 100 mm platen with a mass of 300 g.

3.1.2 Methods B, C, D, E and F: 100 x 100 mm platen with a mass of 100 g.

3.1.3 To facilitate ease of thickness measurements the platen may be as much as 10 mm wider in each direction (i.e., maximum 110 x 110 mm). However, care shall be taken to ensure that platen mass remains at either 100 g or 300 g, depending on the method used.

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3.2 Compression Machine (Optional): capable of compressing the specimen at a rate of 50 mm/min without impact.

3.3 Load mass: mass applied to the platen ranging from 2.25 kg to 35 kg, depending on the method used

3.4 Thickness measurement: Scale, calipers or other device capable of measurement of sample thickness while constrained by platen with an accuracy of ± 0.5 mm. Thickness may be measured at the center point of the platen, or, alternatively, by measuring the thickness at the center of each of the four sides of the sample and averaging these values.

3.4.1 Definition of thickness values

As referenced in this document, thickness values of test specimens are defined as follows:

T_1 = initial thickness with platen, depending on platen weight used

T_2 = thickness under application of compression load

T_3 = thickness after removal of compression load, with platen

3.5 Test Specimen: From the material to be tested, cut enough specimens 100 x 100 mm to achieve a minimum thickness of 25 mm when plied together. This thickness should be as uniform as possible over the entire surface of the specimen. Total thickness should not exceed 50 mm. See figure 1 for a sketch of the compression setup.

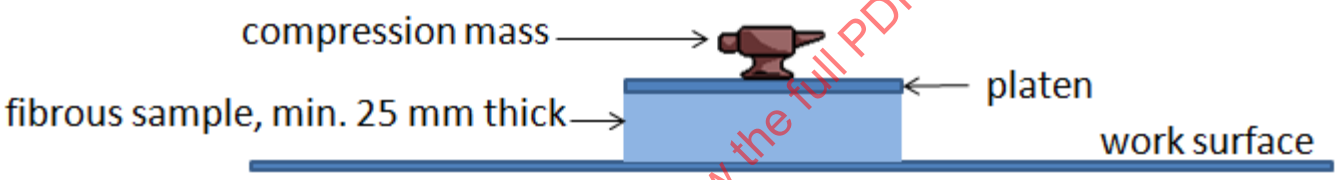

FIGURE 1 - SKETCH OF FIBROUS INSULATION MATERIAL WITH PLATEN AND WEIGHT APPLIED

4. CONDITIONING

Except as indicated for specific tests below, tests for material classification and for arbitration purposes shall be made on material conditioned in a controlled atmosphere of 21 °C ± 1 °C and 50% ± 5% relative humidity. Test specimens should be fully exposed to this controlled atmosphere for a minimum of 12 hours prior to testing. Tests should be conducted on conditioned samples unless otherwise specified, for example, for informal audits.

5. PROCEDURE - METHOD A, NORMAL WITH 35 KG LOAD

5.1 Ply sufficient layers of the specimen together to achieve a minimum thickness of 25 mm.

5.2 Add the 300 g platen.

5.3 Apply a load of 2.25 kg on top of the platen for 1 minute. If a dead weight is used, add it slowly without impact. If a compression machine is used, apply the load at a rate of 50 mm/min. Remove the load, then immediately measure the thickness and record as T_1.

5.4 Apply a load of 35 kg on top of the platen. If a dead weight is used, add it slowly without impact. If a compression machine is used, apply the load at a rate of 50 mm/min. For this 35 kg load a compression machine is highly recommended. Measure the thickness as soon as the full load is attained and record as T_2.

5.5 Hold this load for 5 minutes, then remove the load and allow specimen to recover for 5 minutes with the platen on the specimen.

5.6 Measure the thickness and record as T_3.

6. PROCEDURE - METHOD B, NORMAL WITH 3 KG LOAD

6.1 Ply sufficient layers of the specimen together to achieve a minimum thickness of 25 mm.

6.2 Add 100 g platen. Measure the thickness and record as T_1.

6.3 Apply a load of 3 kg on top of the platen. If a dead weight is used, add it slowly without impact. If a compression machine is used, apply the load at a rate of 50 mm/min. Measure the thickness as soon as full load is attained and record as T_2. Allow the load to remain in place for 1 minute.

6.4 Remove the load and allow the specimen to recover for 3 minutes with the platen on the specimen.

6.5 Measure the thickness and record as T_3.

7. PROCEDURE - METHOD C, NORMAL WITH 4.5 KG LOAD, 16 HOUR LOAD APPLICATION

7.1 Ply sufficient layers of the specimen together to achieve a minimum thickness of 25 mm.

7.2 Measure and record T_1 as described in Method B.

7.3 Apply a load of 4.5 kg on top of the platen. If a dead weight is used, add it slowly without impact. If a compression machine is used, apply the load at a rate of 50 mm/min. After the load has been applied for 16 ± 1 hr, measure the thickness and record as T_2.

7.4 Remove the platen and load and let the sample expand for 24 ± 1 hr.

7.5 Replace the 100 g platen, then measure the thickness and record as T_3.

8. PROCEDURE - METHOD D, ELEVATED TEMPERATURE WITH 4.5 KG LOAD, 16 HOUR LOAD APPLICATION

8.1 Ply sufficient layers of the specimen together to achieve a minimum thickness of 25 mm.

8.2 Measure and record T_1 as described in Method B.

8.3 Place the sample in an environmental chamber at an ambient temperature of 45 °C ± 2 °C. Relative humidity at this temperature is not critical but it is recommended that the absolute humidity not vary appreciably from ambient conditions specified in section 3 to avoid possible water condensation during cooling. Apply a load of 4.5 kg on top of the platen. If a dead weight is used, add it slowly without impact. If a compression machine is used, apply the load at a rate of 50 mm/min. After the load has been applied for 16 ± 1 hr, measure the thickness and record as T_2. It can be necessary to remove the specimen from the environmental chamber to make an accurate measurement of T_2.

8.4 Remove the platen and 4.5 kg load, reposition the specimen in the environmental chamber at an ambient temperature of 45 °C ± 2 °C and let the specimen expand for 24 ± 1 hr. Remove from elevated temperature and allow to cool in a controlled atmosphere of 21 °C ± 1 °C and 50% ± 5% relative humidity for a minimum of 2 hr.

8.5 Replace the 100 g platen, then measure the thickness and record as T_3.