

**MEASUREMENT OF DAMPING COEFFICIENT OF
SOUND DEADENING MATERIALS**

Application

This method is used to determine the decay rate and decay time of sound deadening materials.

Apparatus Required

Fixture

See Figure 4a, b for dimensions, materials and construction.

Test Fuel

Body sheet steel, size 500 +/- 0.5 x 500 +/- 0.5 x 6 +/- 0.1 mm, surface finish 0.9 - 1.8 micrometre C.L.A.

Note: The decay rate of the test panel should be 0.5 dB/second, maximum 0.8 dB/second.

Excitation and Measuring Device

For arrangement see drawing.

- | | |
|---|-------------|
| * Beat Frequency Oscillator | Type 1017 |
| * Microphone Amplifier | Type 2603 |
| * Recorder Oscilloscope | Type 2305 |
| * Vibration Pick-up Preamplifier | Type 2615 |
| * Pick-up Exciter, see drawing 5 | Type MM0004 |
| * Source: Bruel & Kjaer AG
Copenhagen
Denmark | |

The material under test is applied to the test panel which is supported at its four principal nodes on the fixture. (The nodal pattern is a square connecting the midpoints of the edges of the panel. See drawing 3). The test assembly is excited to vibrate at its fundamental frequency and the rate of decay of free vibration recorded and measured.

Mechanical Convection Oven

Capable of maintaining temperatures up to 165 +/- 2 °C.

Date	Action	Revisions
2001 10 31	Revised	Editorial – no technical change A. Cockman
1994 02 28		

Printed copies are uncontrolled

Page 1 of 7

Cold Box

Capable of maintaining temperatures down to - 40 +/- 2 °C.

Note: Both the mechanical convection oven and the cold box must be large enough to accommodate the fixture with test panel.

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

Procedure

The test must be performed at a temperature of 20 +/- 2 °C unless otherwise required by the relevant Engineering Specification.

Note: The test must be performed at the specified temperature in the mechanical convection oven or in the cold box. Before the evaluation ensure that the assembly has attained test temperature.

To ensure that the decay rate of the test panel is within the specified limits, the test must be first performed with the uncoated panel.

1. After determining the weight (G_1), the uncoated and degreased panel is positioned on the fixture so that it is supported by the 4 springs at its principle nodes (Figure 3).
2. By means of the beat frequency oscillator and the exciter, the test panel is excited to vibrate at its fundamental frequency, which is about 180 Hz.

Note: The frequency of the test panel is twice the frequency of the beat frequency oscillator.

3. The decay rate of free vibration of the test panel is recorded and measured (paper speed about 5 mm/second; see Figure 2).
4. The material under test is then applied to the test panel in accordance with the requirements of the relevant Material Specification and/or drawing with respect to type of application and thickness of material.
5. If the material under test is of the heat curing or heat fusion type, the test assembly is then cured for 10 minutes at an object temperature of 110 °C (thermocouple inserted) unless otherwise required by the relevant Material Specification.

6. After conditioning at 23 +/- 2 °C for 24 h, determine the weight G_2 of the test assembly.

7. The assembly is tested three times as outlined in paragraphs 1 - 3.

Note: The recorder paper speed may be increased for materials of high decay rate.

Evaluation

Determine and record the following:

a. Weight of applied material.

$$G(g) = G_2 - G_1$$

Where: G = Weight of material applied in g.

G_1 = Weight of uncoated test panel in g.

G_2 = Weight of coated test panel in g.

b. Decay time in seconds (see drawing 2).

c. Decay rate in dB/second (see drawing 2).

The chart record should be attached to the test report.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.