K&SE SERVICES

- Architectural Acoustics and Building Noise Control
  - Field/Laboratory Measurements
  - HVAC and Mechanical Equipment Noise and Vibration
  - Condominium & Studio Sound Isolation
  - Room Acoustics & Music Rooms
  - EASE Modeling and Analysis
  - Audio/Video System Design & Specification
  - Speech Privacy & Sound Masking
  - Acoustic Test Facility Design and Consulting
- Automotive Noise and Vibration
  - Noise Source Diagnostics/Path Analysis
  - Sound Package Development
  - Acoustical Material Optimization
  - On-Road/In-Vehicle Testing
  - Component Testing
  - Material Performance Evaluation
  - Subjective (Jury) Evaluations
  - Acoustics Seminars & In-House Training
- Community/Environmental Noise
  - Noise Level Monitoring and Control
  - Equipment and Facility Noise Predictions
  - Traffic Noise Assessment
  - Municipal Noise Ordinances
  - Ground Vibration Measurements & Diagnostic Studies
  - Expert Testimony
- Industrial Plant Noise
  - Engineering Noise Control Recommendations/Design
  - Noise Control Research
- Product Noise
  - Laboratory Noise Measurements/Analysis
  - Noise Source Diagnostics
  - Noise Control Recommendations
  - Acoustical Package Optimization

K&SE FACILITY

- Full-Size Reverberation Room (200m^3)
- Small Volume Reverberation Room (25m^3)
- Hemi-Anechoic Chamber
- Small Anechoic Chamber
- Normal Incidence Sound Absorption/Transmission Loss
- SAE J1400 STL Test Fixture
- Vibration Damping Test Fixtures
- Environmental Chamber

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17025
TESTING LABORATORY

Kolano & Saha Engineers, Inc. is an independent professional engineering and consulting company in the areas of:

- Automotive Acoustics
- Acoustic Test Facility Design
- Architectural/Building Related Acoustics and Noise Control
- Community Noise and Vibration
- Industrial Noise
- Product Noise

Our Goals:

- Help our clients achieve quality acoustics in their products, buildings, vehicles, components, and materials through cost-effective means.
- Provide exceptional service.
- Achieve complete client satisfaction.
- Work as a team with our staff and clients.

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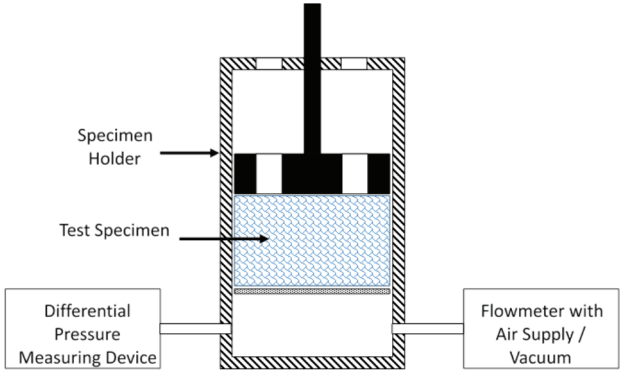
ACOUSTICAL MATERIAL

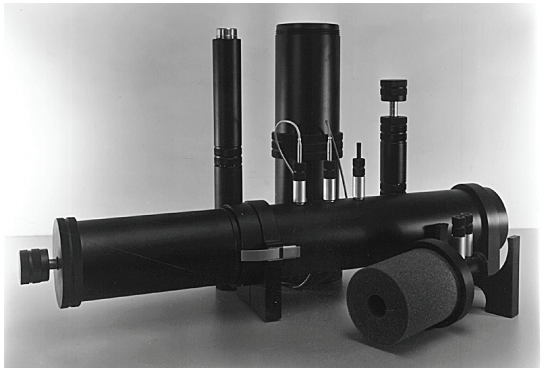
Kolano and Saha Engineers, Inc.
Consultants in Acoustics, Noise & Vibration

ACOUSTICAL MATERIAL EVALUATION



Airflow Resistance Setup

NORMAL INCIDENCE SOUND ABSORPTION TESTING

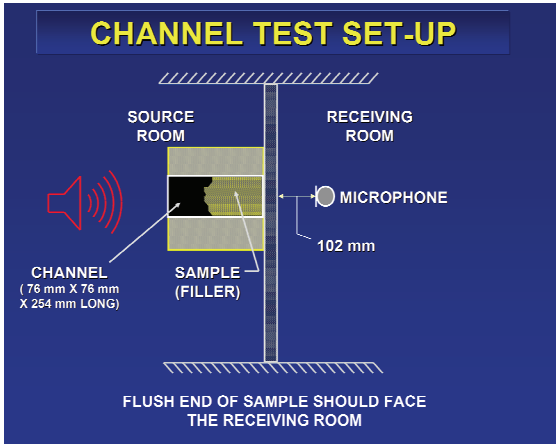


This measurement is conducted per ASTM Standard E1050 or equivalent. Material properties, such as impedance, that are needed to do predictive analyses can also be determined.

RANDOM INCIDENCE SOUND ABSORPTION TESTING

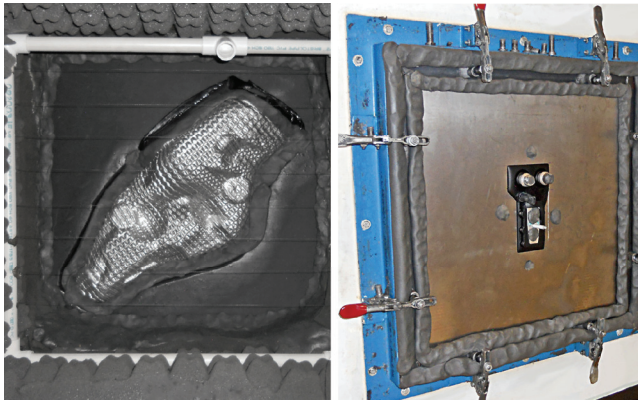
This measurement is made in a full size reverberation room following ASTM Standard C423 and/or small reverberation room following SAE J2883.

BODY CAVITY FILLER

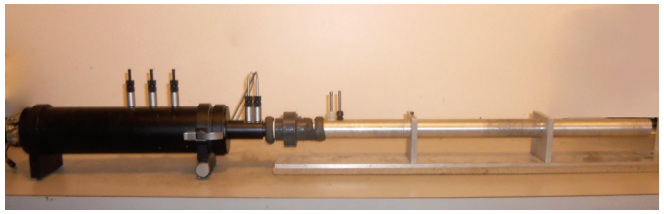


A square shaped channel that simulates a body cavity (pillars and rockers of a vehicle) is used to determine the acoustical performance of filler materials when inserted in the channel. This procedure has the capability to rank order performance under "in-situ" conditions. This test emphasizes the effectiveness of material expansion and the ability to seal the pinch-weld areas.

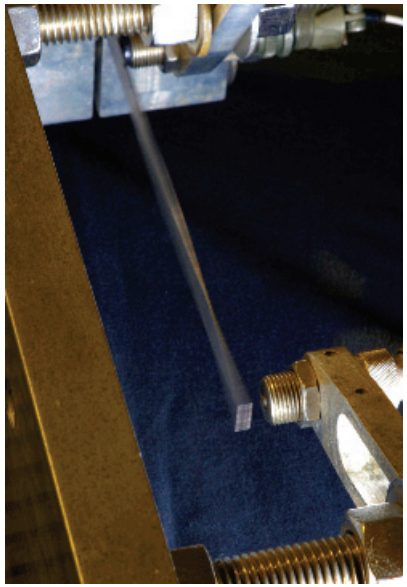
SOUND TRANSMISSION LOSS



Sound Transmission Loss characterizes the performance of a barrier, a barrier assembly, or a passthrough. Measurements are conducted following SAE J1400 or ASTM E2249 to determine the amount of sound energy blocked from propagating between one area and another.

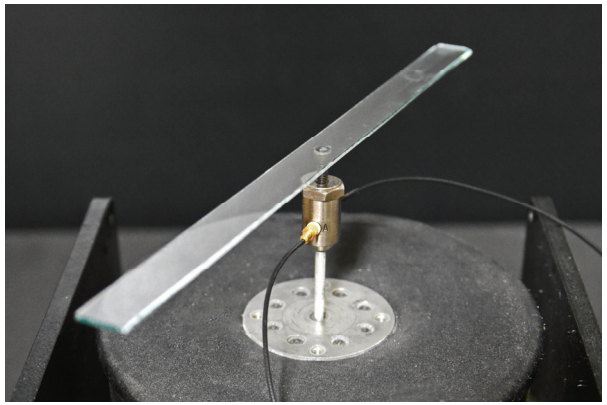


Oberst Bar Vibration Damping



This characterizes the performance of a visco-elastic material to reduce structure-borne noise. The visco-elastic material is bonded to a bar or a panel that is excited structurally to measure the damping performance. Measurements are conducted following SAE J1637 or ASTM E756. These measurements are often called Oberst bar tests. Results can be obtained for the material and the bar combined or for the material by itself.

CenterPoint Vibration Damping



A bar excited at the center with a shaker is the mechanical impedance or CenterPoint test. Measurements are made per ISO 16940 or equivalent test methods.