

ACOUSTICS FUNDAMENTALS

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WHAT IS ACOUSTICS?

The Science of Sound -- a branch of Physics

WHAT IS SOUND?

Organized vibrations of air molecules

SOME ACOUSTICAL FACTS

Sound has two important qualities

Qualities that we can hear - and measure

Frequency

and

Level

ACOUSTICAL FACTS

Sound Frequency

- Frequency -- also called "pitch"
low pitch (hum)
high pitch (hiss)

-Sound frequency is described by the measurement unit of "hertz" (Hz) or "cycles per second"

-Sound frequency is related to something called "acoustic wavelength" or "wave size"

MORE ACOUSTICAL FACTS

*What is the 'size' or dimension of sound?
(spacing between wave peaks)*

-Speed of Sound

-1100 feet per second at room temp.

- Acoustic wavelength

-As frequency (pitch) goes higher, wavelength gets smaller.

-At 100 hertz wavelength is ~ 10 feet.

-At 1000 hertz wavelength is ~ 1 foot.

**-At 10,000 hertz (10 kHz)
wavelength is ~ 1 inch.**

SOME ACOUSTICAL FACTS

Sound Level

-Sound Level -- also called "loudness" or "intensity"

low intensity (whisper)

high intensity (jet plane take-off)

-Sound level is described by the measurement unit of "decibel" (dB) named after A.G. Bell (telephone inventor)

ACOUSTICAL QUALITY OF LIFE

What contributes to acoustical quality

Noise

Privacy

Aesthetics

WHAT IS NOISE?

Noise is UNWANTED sound!

ACOUSTICAL QUALITY

What are the Effects of Noise

(with increasing noise level)

- Annoyance / Conflict
- Interferes with Sleep
- Interferes with Speech Communication
- Causes Fatigue / Poor Concentration
- Causes Permanent Hearing Damage
- And other Medical Problems

NOISE IN THE COMMUNITY

What are some major causes of noise

- **Mechanical Systems (roof top units, fans)**
- **Power Systems (electric generators)**
- **Production Machinery**
- **Transportation (cars, trucks, planes, trains)**
- **Construction/Maintenance Equipment**
- **Commercial Business (restaurants, bars)**
- **People (neighborhood activity)**

NOISE IN THE COMMUNITY

Why are there noise problems?

- Need to reduce renovation and initial construction costs
- Plans are developed without considering acoustical function of businesses
 - You can't "see" it
 - Problems don't surface immediately, not until experienced - no awareness
- Retrofit cost for noise control not in budgets

NOISE IN THE COMMUNITY

What is the PRIMARY solution to noise

DUCT TAPE !!

You are now
fully qualified
in

Acoustics
Fundamentals