



DDS ACOUSTICAL
SPECIALTIES

ABCs of Acoustics



About DDS Acoustical Specialties

The short version

- ✓ **Improving Sound Quality**
- ✓ **Increasing Privacy**
- ✓ **Ensuring Noise Safety**

DDS Acoustical Specialties is a company that provides sound solutions to noise problems, throughout the Northeast US.



About Us

The short version

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Agenda

- 1. Acoustics 101**
- 2. Noise in Occupational Safety and Health**
- 3. Acoustic Absorbers**
- 4. Acoustic Barriers**
- 5. Acoustic Composites**
- 6. Other Acoustic Solutions**

Acoustics 101

Common Terms

Acoustics – The Science of sound and its behavior in different environments

Sound - What we hear which is made up of changes in air pressure in the form of waves, composed of frequencies

Noise - Any unwanted sound

Airborne vs. Structure Borne Noise

- Airborne noise is created from a noise source such as the TV, music, or someone speaking
 - Vibrations moving through the air
- Structure borne noise is created by an impact such as footsteps or hammering
 - Creates pressure variations in the ear

Decibel (dB) - A measurement of sound levels, the volume of sound energy.

- Perceived volume of a sound depends on:
 - The level of sound pressure (how much of it)
 - The tone of pitch of the sound (frequency)

Acoustics 101

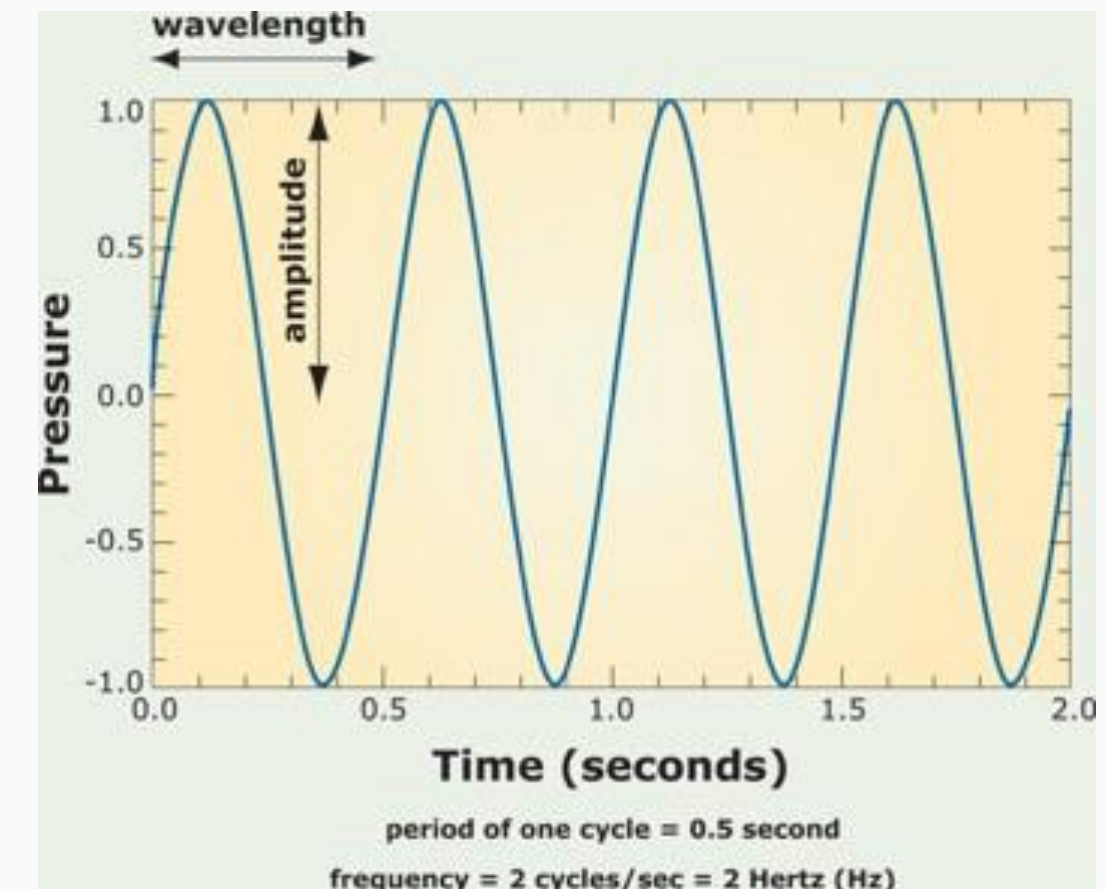
Common Terms

Frequency (f) - Periodic vibration audible to the average human. Property of sound that determines pitch and is measured in hertz (Hz)

- **Hertz (Hz)** - The standard measure of frequency of oscillations in a sound wave, given in "cycles per second."
 - Frequency is 1 Hz per each oscillation that occurs in one second
 - When 1000 oscillations occur in one second, the frequency is 1000 Hz

The range of audible frequencies is 20 Hz to 20,000 Hz

- Low frequencies below 20 Hz is felt rather than heard
- Mid frequency between 500 Hz – 2000 Hz is where speech occurs
- High frequencies are the first to be affected by hearing loss due to age and/or prolonged exposure to very loud noises



Acoustics 101

Common Terms

Reverberation – A persistence of sound or echo after a sound is produced

- Reduced by adding absorptive acoustic material

Reverberation Time

- A measure of time required for a sound to “decay” in an enclosed area after the source sound has stopped
- RT60 is the amount of time it takes for sound to decay by 60 dB in a space

Measuring RT60

- **Factors include:**
 - Volume & surface area of a room
 - Construction materials of surfaces
 - Any existing sound absorption

$$T_{60} = \frac{24 \ln 10^1}{c_{20}} \frac{V}{Sa}$$

T_{60} = time it takes for a sound to decay by 60 dB

c_{20} = speed of sound in the room

V = volume of the room (in cubic meters)

S = total surface area of room (in square meters)

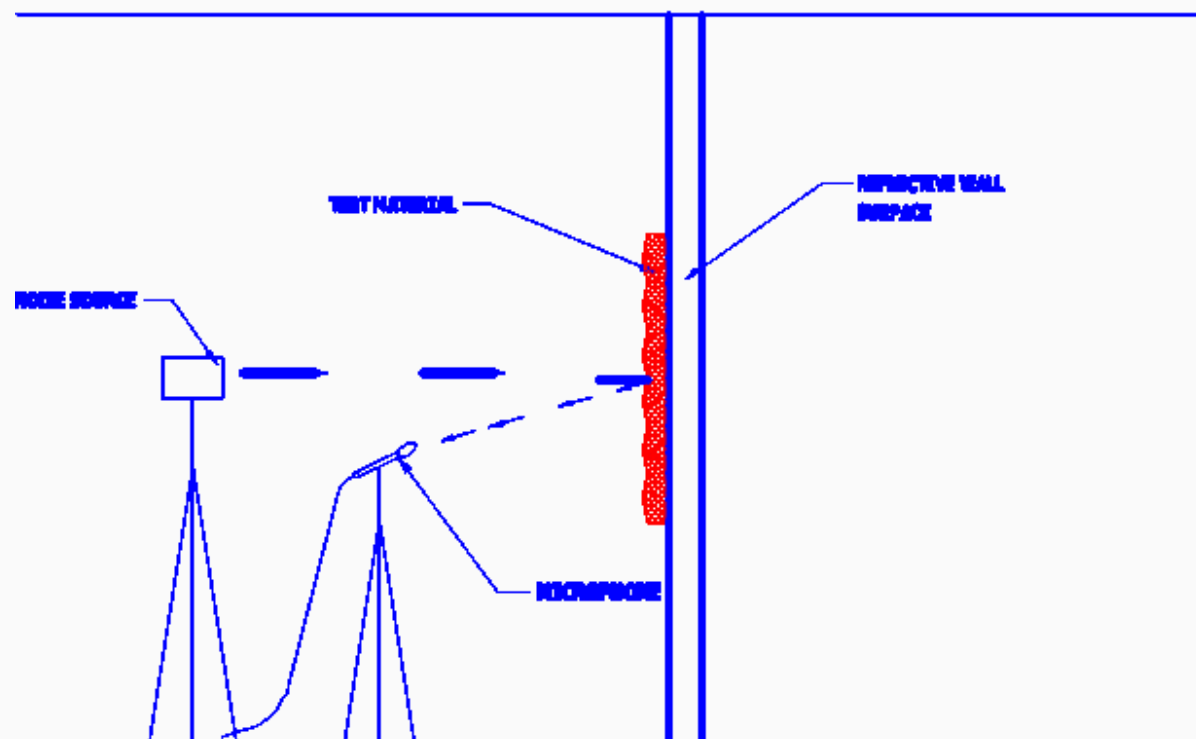
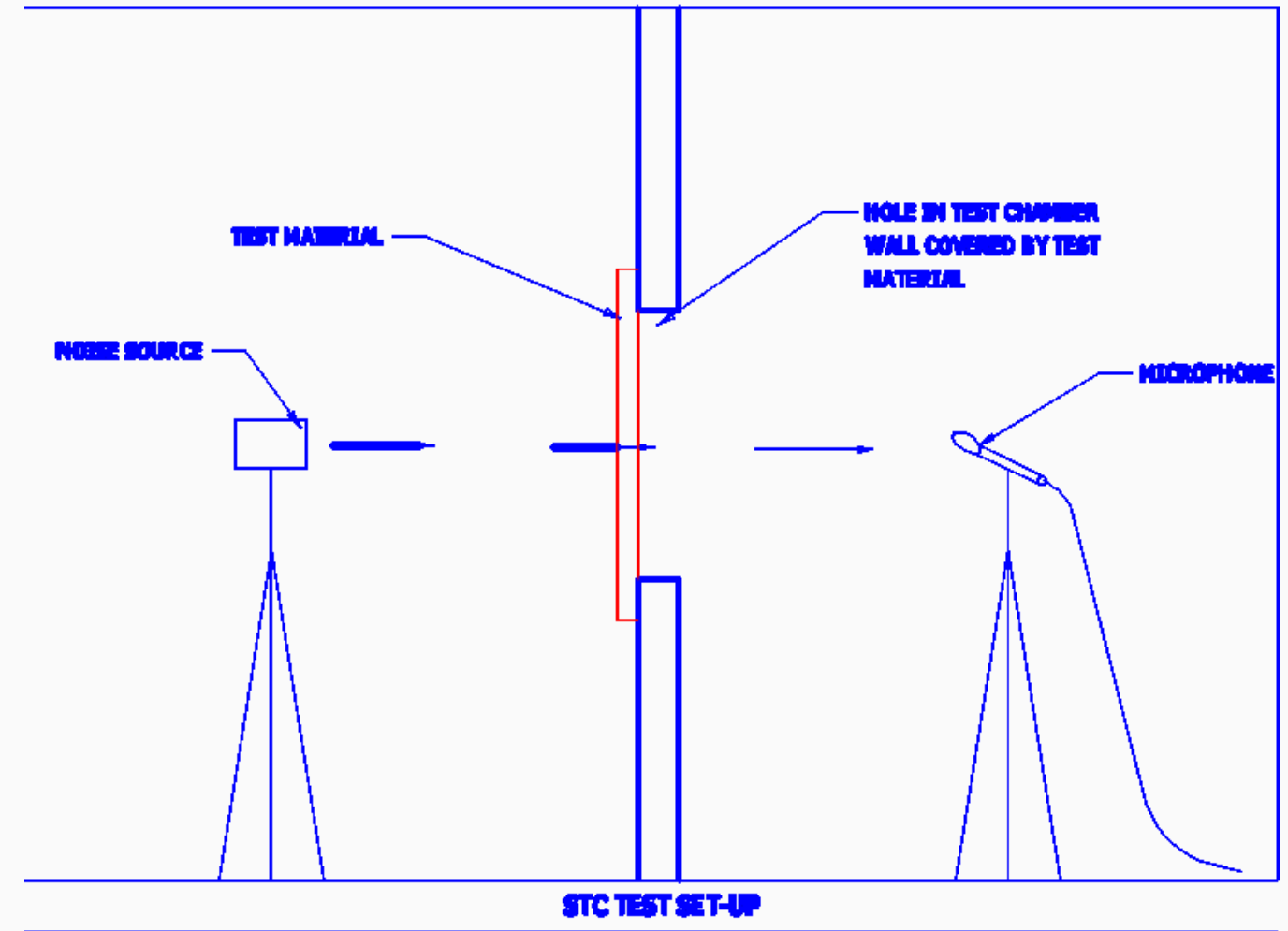
a = average absorption coefficient of room surfaces

Acoustics 101

Common Terms

Noise Barrier - Any material that blocks the transmission of sound, measured using STC

- **STC (Sound Transmission Classification)** - Measures transmission loss properties at various frequencies (i.e. how much noise is blocked).
- Yields a single number rating (ex. STC 30)



Sound Absorber - Any material that absorbs sound

- **NRC (Noise Reduction Coefficient)** - Measures sound absorption properties at various frequencies. (i.e. percentage of sound energy absorbed from a noise source).
- Yields an average percentage rating (ex. NRC .85)

Decibel

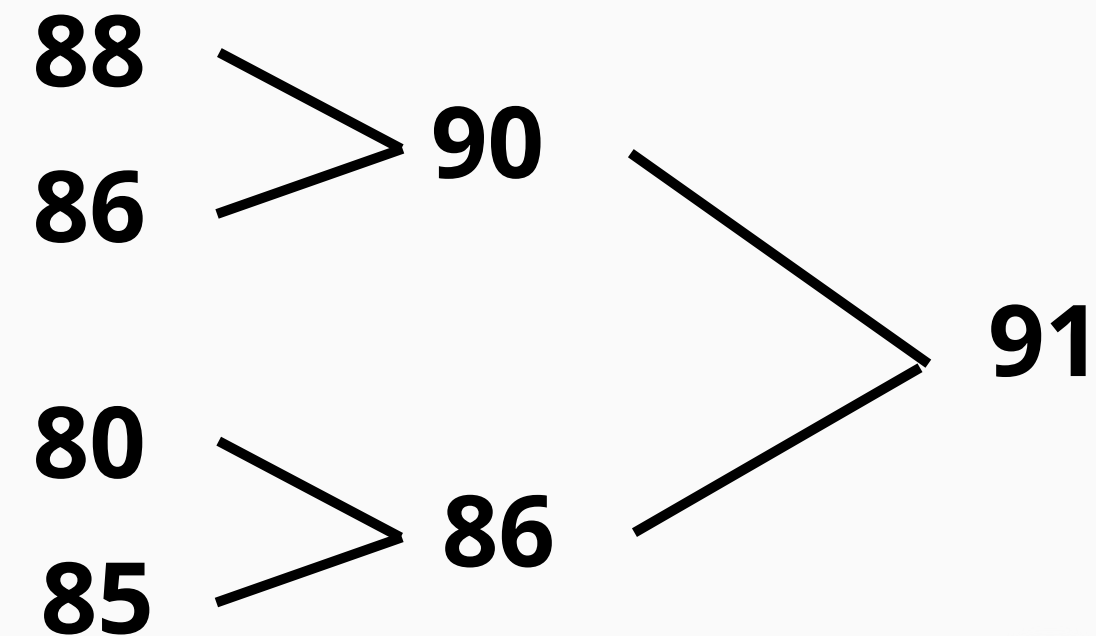
How does noise add up?

Decibels progress in a logarithmic manner

- Percentages do not work with sound
- $110 \text{ dB(A)} = 10 \times 100\text{dB(A)}$
 - A machine that measures 110 dB(A) is **not 10 percent louder** than one that measure 100 dB(A) . It is actually **twice as loud!**
- **A 10dB increase or decrease equates to double or half the noise**

To add two noise sources:

If the difference in dB is:	Add to the higher initial noise source
0-1	+3
2-3	+2
4-9	+1
10+	+0



Acoustics 101

Common Terms - Weighting Scales

"A" Scale - A weighting given to various frequencies to equate to how the human ear actually hears sounds

- Certain frequencies are easier for humans to hear or are more bothersome than others

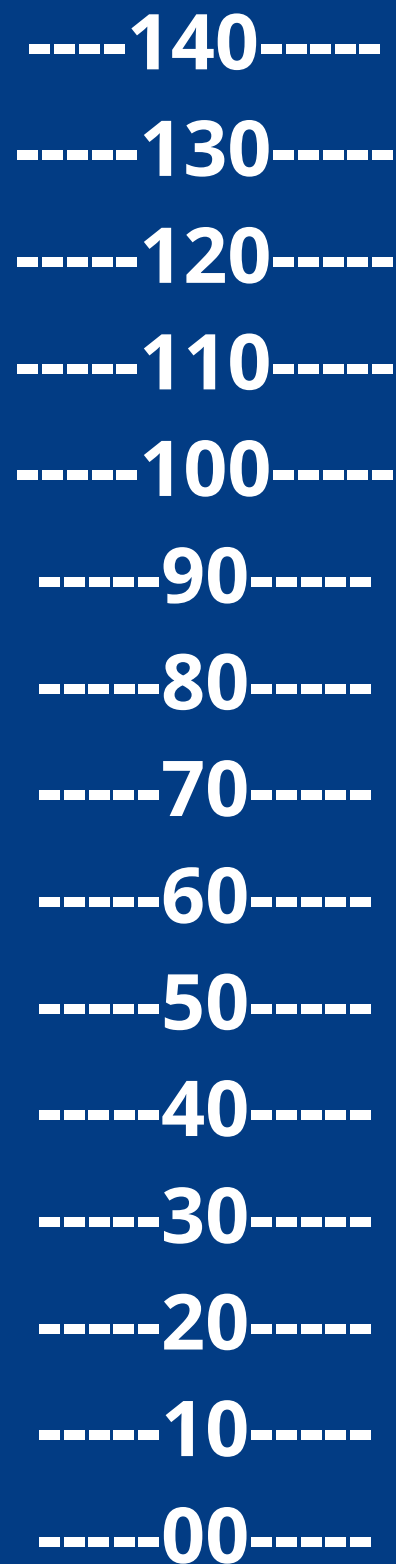
FREQUENCY (HZ)	A SCALE
31.5	-39.4
63	-26.2
125	-16.1
250	-8.6
500	-3.2
1000	0
2000	1.2
4000	1.0
8000	-1.1

Sound Pressure Levels Chart

How loud is too loud?

On this decibel (dB) scale, zero is the average least perceptible sound and 130dB is considered an area of painful sound. The examples below demonstrate common situations and decibel levels.

dB



Bedroom of a Country Home
~30dBA



Quiet Living Room
~40dBA



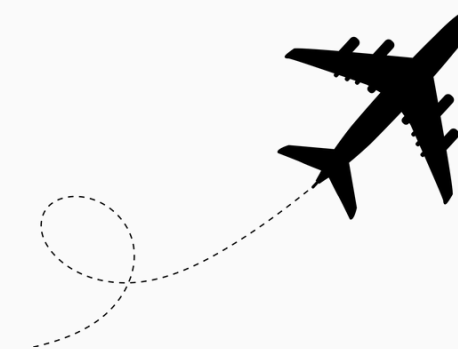
Normal Conversation
~60dBA



Running Tractor @15m
~78-95dBA



Amplified Rock Music
~110dBA



Jet Taking Off @60m
~120dBA

Acoustics 101

Rules of Thumb

- **Making a space 50% quieter means a 10 decibel (dB) noise reduction**
- **Doubling the mass of a noise barrier results in approximately 5dB transmission reduction**
- **The best barriers breaks line of sight and are double the height and length of the noise source**
- **Sealing gaps and airways can greatly reduce sound transmission**
- **For every doubling in distance from a noise source +/- 6db (in an open field test)**

Noise in Occupation Safety and Health

An environment that promotes proper acoustics to mitigate excessive occupational noise helps everyone.

- Prevents Hearing Loss and Other Health Issues
- Reduces Loud, Distracting Noise
- Enhances Concentration and Productivity
- Ability to Hear Important Warnings or Announcements
- Promotes Employee Well-being and Mental Clarity
 - Less Stress
 - Less Fatigue



OSHA Noise Standards

OSHA requires employers to implement a hearing conservation program when noise exposure is at or above 85 decibels averaged over 8 working hours, or an 8-hour time-weighted average.

- **Engineering Controls**

- Involve modifying or replacing equipment, or making related physical changes at the noise source
- Use of sound barrier curtains and walls, acoustic enclosures, vibration isolation, and acoustic absorbers

- **Administrative Controls**

- Reducing the amount of time workers are exposed to noise sources
- Providing areas of noise relief
- Restricting working presence to a suitable distance away from noise sources

- **Hearing Protection Devices**

- Earmuffs and Plugs
- Less desirable and generally used during time necessary to implement engineering or administrative controls or when such controls are not feasible.

Flammability Ratings

Standard Test Method for Surface Burning Characteristic of Building Materials

Steiner Tunnel Test – ASTM E84

- Also used in NFPA 255
- UBC 42-1
- UL 723
- Measures Smoke Density & Flame Spread
 - A “25/50” rating requirement means the flame spread is not more than 25 and the smoke density is not more than 50



Flammability Ratings

Classifications

Based on the National Fire Protection Association (NFPA 701)

Class A

- Flame Spread: 0-25
- Smoke Developed: 0-450

Class B

- Flame Spread: 26-75
- Smoke Developed: 0-450

Class C

- Flame Spread: 76-200
- Smoke Developed: 0-450



The ABCs of Acoustics

Categories of Acoustic Products Simply Explained



Absorbers

Barriers

Composites

Absorbers

Categories of Acoustic Products Simply Explained

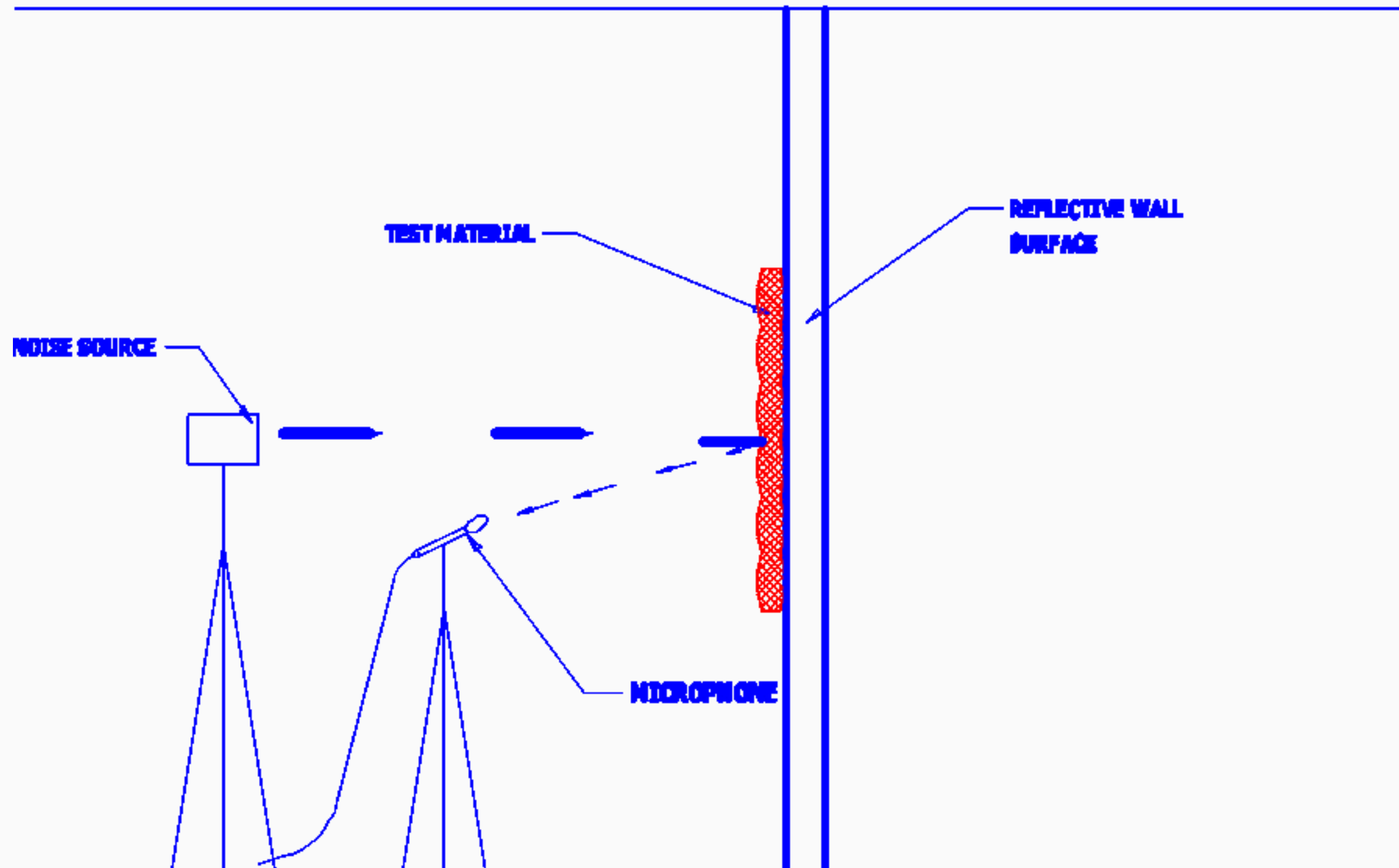
- Reduces the reflection of sound waves
- Soft, porous, open-celled materials
- For architectural applications includes:
 - Wall & Ceiling Panels (fabric wrapped, painted, or printed)
 - Baffles & Clouds
- For industrial applications includes:
 - Quilted Fiberglass Absorbers
 - Foam Sheets
 - PVC Baffles, Clean Baffles
- Efficacy measured using NRC rating



Absorbers

Categories of Acoustic Products Simply Explained

Standard Test Method for Sound Absorption (Per ASTM C 423)



NRC Ratings for Common Building Materials

Material	NRC
Brick, painted	.00 - .02
Brick, unpainted	.00 - .05
Carpet, indoor-outdoor	.15 - .20
Carpet, heavy on concrete	.20 - .30
Carpet, heavy on foam rubber	.30 - .55
Concrete (smooth), painted	.00 - .05
Concrete (smooth), unpainted	.00 - .20
Concrete (block), painted	.05
Concrete (block), unpainted	.05 - .35
Cork, floor tiles (3/4" thick)	.10 - .15
Cork, wall tiles (1" thick)	.30 - .70
Drapery, light weight (10oz.)	.05 - .15
Drapery, medium weight (14oz.), velour draped to half	.55
Drapery, heavy weight (14oz.), velour draped to half	.60

Material	NRC
Fabric on Gypsum	.05
Fiberglass, 3-1/2" batt	.90 - .95
Fiberglass, 1" Semi-rigid	.50 - .75
Glass	.05 - .10
Gypsum	.05
Linoleum on Concrete	.00 - .05
Marble	.00
Plaster	.05
Plywood	.10 - .15
Polyurethane Foam (1" thick, open cell, reticulated)	.30
Rubber on Concrete	.05
Seating (occupied)	.80 - .85
Seating (unoccupied), metal	.30
Seating (unoccupied), wood	.30

Material	NRC
Seating (unoccupied), fabric upholstered	.60
Seating (unoccupied), leather upholstered	.50
"Soundboard" (1/2" thick)	.20
Sprayed Cellulose Fibers (1" thick on concrete)	.50 - .75
Steel	.00 - .10
Terrazzo	.00
Wood	.05 - .15

Absorbers

Categories of Acoustic Products Simply Explained

Noise Reduction Coefficient (NRC) Test Results

Freq. (Hz)	Abs. Coefficient	Uncertainty %
125	0.07	4.1
250	0.27	2.8
500	0.98	1.7
1000	1.13	0.9
2000	1.08	0.6
4000	0.99	0.6

NRC = .85

Sound Absorbers

ABCs of Acoustics



Fabric Wrapped Panels

*Walls | Ceiling | Clouds
Architectural*



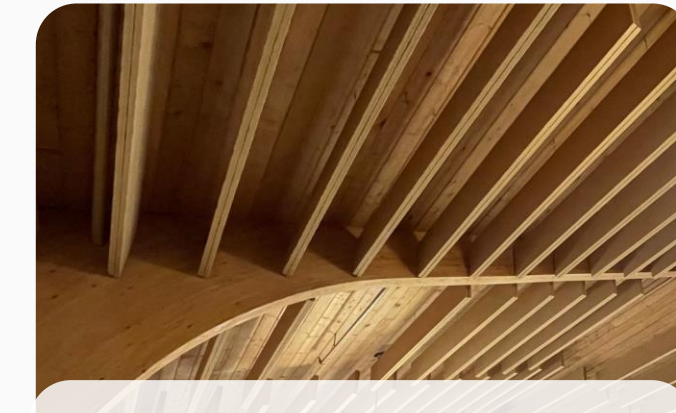
Paintable Panels

*Walls | Ceiling | Clouds
Architectural*



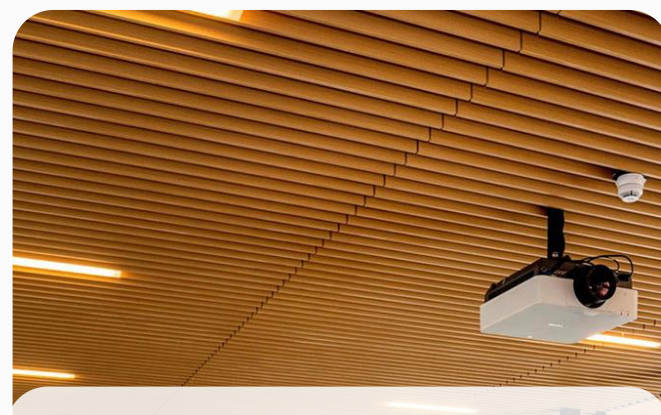
Printable Panels

*Walls | Ceiling | Clouds
Architectural*



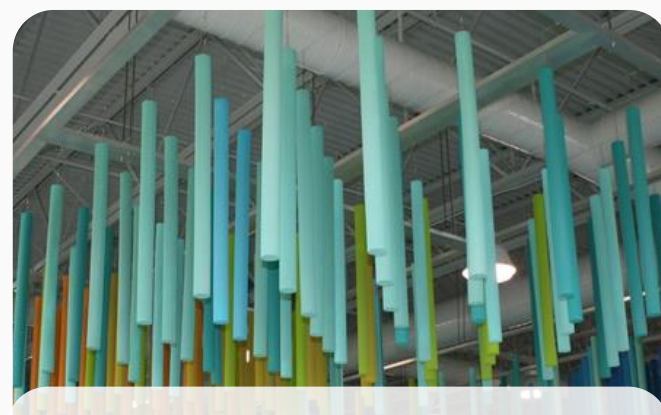
Baffles

*Ceiling
Industrial/Architectural*



Acoustic Wood

*Walls | Ceiling
Architectural*



Foam

*Walls | Ceiling | Clouds
Industrial/Architectural*



PET Felt

*Walls | Ceiling | Clouds
Architectural*



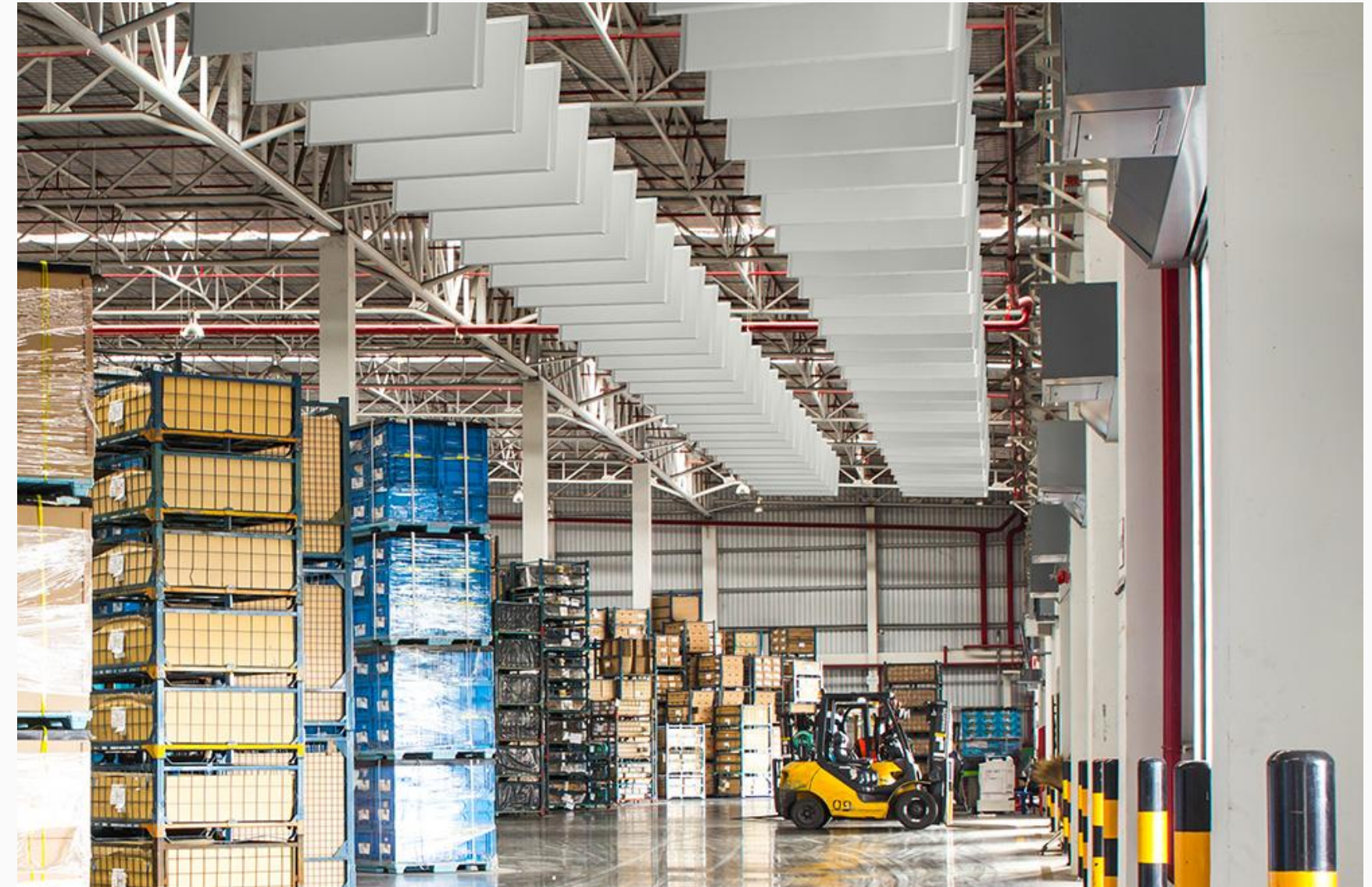
Quilted Fiberglass

*Walls | Ceiling
Industrial*

Semi-Rigid Baffles

Acoustical Sound Absorbers

- Semi-Rigid Baffles are stitched or heat sealed for strength and durability and hung via grommets
- Available Sizes:
 - 1" thick -3#
 - 1.5"thick -1.5"#
 - 2" thick -1.5#
 - 2'x4' and custom sizes up to 4'x10'
- Most economical baffle sound treatment
- Super high NRC ratings
- Class A fire rated
- Facing Options that are:
 - FDA Approved, USDA Listed
 - Washable
 - Light Reflective
 - PVC or Polywrap for Color Options
- Can be easily removed and moved
 - Good for Rental Spaces



Semi-Rigid Baffles

Acoustical Sound Absorbers

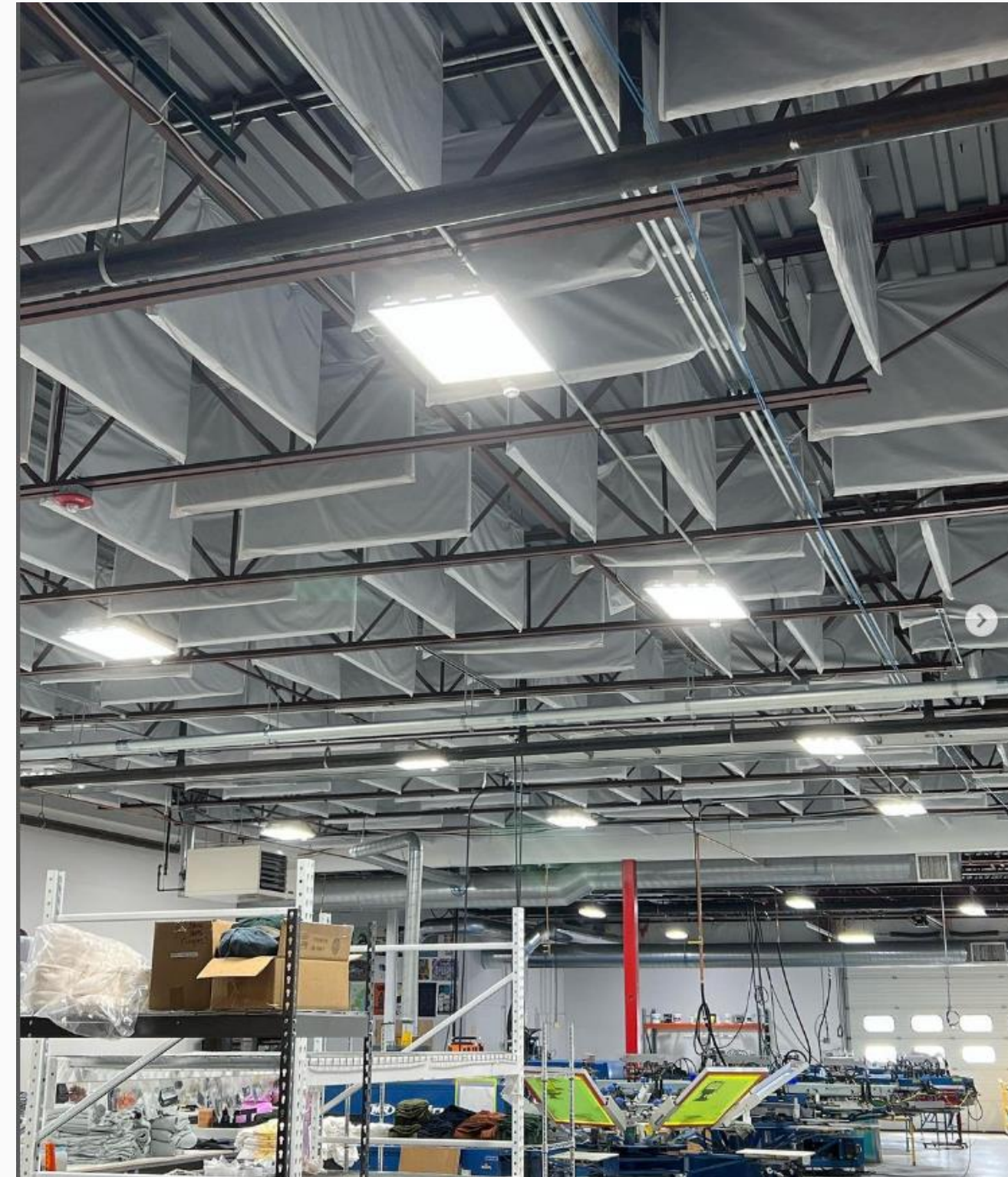
Application – Printing Facility

The Problem:

- Equipment created too much noise build up
- Needed an economical solution

Solution:

- Semi-Rigid Polywrap Baffles
- Reduced noise by approximately 6db
- Removed High Frequency, annoying sounds from machinery



Quilted Fiberglass

Acoustical Sound Absorbers

- Soft, porous, open-celled materials that are used to reduce the reflection of sound waves
- Generally used in industrial applications
 - Wall Coverings
 - Components with Enclosures
- Superior sound absorption
- Lightweight & flexible
- Class A fire rated
- Maximum durability
- Long life span
- Available for custom fabrications
- Colors Available – Gray, Tan, Black, Off White



Foam Baffles

Acoustical Sound Absorbers

- Extremely lightweight
- Easy to install on ceilings
- Available with various facing patterns (flat, pyramid, omni-directional)
- Custom sizing
- Standard colors
 - White
 - Charcoal
 - Light Gray
- Optional acoustic coating for custom colors
- High NRC ratings
- Class A fire rated



Foam Panels

Acoustical Sound Absorbers

- Extremely lightweight
- Easy to install on walls, ceiling, or as clouds
- Available with various facing patterns (flat, pyramid, omni-directional)
- Custom sizing
- Standard colors
 - White
 - Charcoal
 - Light Gray
- Optional acoustic coating for custom colors
- High NRC ratings
- Class A fire rated



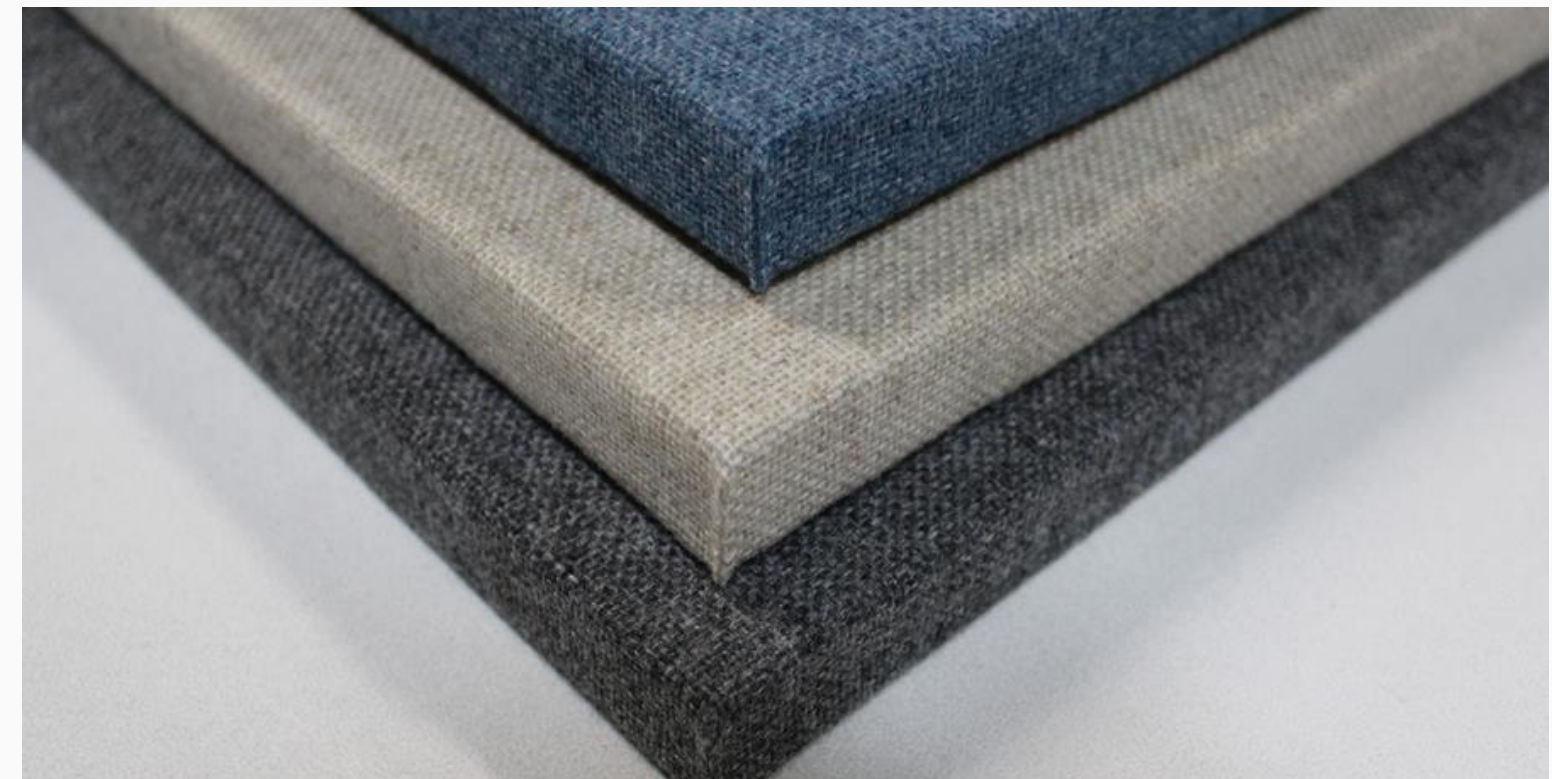
Fabric Wrapped Panels

Acoustical Sound Absorbers

- High-quality, economical, multi-purpose panels
- Sizes up to 4' x 10 and thicknesses from ½" up to 4"
- Class A fire rated
- Standard, designer or C.O.M. fabric
- Custom Sizing
- For walls, ceiling, and cloud mounting
- Up to NRC 1.15

Options include:

- Standard
- High Impact & Abuse
- Tackable
- Absorber + Barrier
- Reflective



Printed Panels

Acoustical Sound Absorbers

- Sizes up to 5' x 10' and thicknesses from ½" up to 2"
- Class A fire rated
- Custom Sizing
- Typical for wall mounting
- Great for displaying images, branding, artwork
 - While providing excellent acoustic absorption



Paintable Panels

Acoustical Sound Absorbers

- Natural white finish blend excellent with white drywall
- Utilizes a paintable finish to color match existing walls and ceilings
- Sizes up to 4' x 10' and thicknesses of 1" or 2"
- Class A fire rated
- Custom Sizing



Rigid Baffles

Acoustical Sound Absorbers

- Rigid Baffles are ideal for applications requiring “crisp” corners and utilize a fabric finish with convenient mounting brackets
- Available Sizes:
 - 1” thick
 - 2” thick
 - 2’x4’ and custom sizes up to 4’x10’
- Easy to install and looks great in more polished, finished spaces.
- High NRC ratings
- Class A fire rated



PET Acoustics

Acoustical Sound Absorbers

COLORS & MATERIALS

PREMIUM COLORS

Custom colors available upon request with minimum order of 2,350 sheets (75,000 sf)



LIGHT BEIGE
FS-300

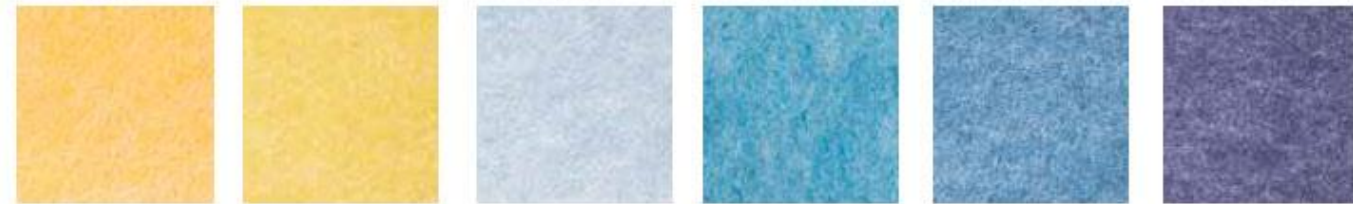
CHESTNUT
FS-810

RED
FS-360

ROSE RED
FS-330

PINK
FS-390

ORANGE
FS-420



APRICOT
FS-450

YELLOW
FS-480

SKY BLUE
FS-720

TRUE BLUE
FS-660

OCEAN BLUE
FS-690

MIDNIGHT BLUE
FS-630



DARK PURPLE
FS-750

PURPLE
FS-780

SEAFOAM GREEN
FS-600

MOSS GREEN
FS-570

GREEN
FS-540

DARK GREEN
FS-510

STANDARD COLORS



BLACK
FS-250

WHITE
FS-100

TAN
FS-190

LIGHT GREY
FS-130

GREY
FS-160

CHARCOAL
FS-220

MADE FROM RECYCLED PLASTIC

Our products do not have coatings or adhesives. Our approach is simple as we only use one material. FSortb is extruded, recycled content polyester, shaped and formed with heat.

MICROBE RESISTANT

Unlike cotton and acoustic fabrics that can attract moisture that generates mold and mildew

DURABLE

Easy to wash, and does not ding or break like paper and fiber based products

LONG LASTING

Ability to absorb sound and still look good for 50 years or more

SAFE

No chemicals, or itchy airborne particles for building users to ever deal with



PET Panels

Acoustical Sound Absorbers

- Made from recycled material
- Easy to install on walls, ceilings, or as clouds
- Custom shapes and sizing
- Various colors
- Class A fire rated



PET Baffles

Acoustical Sound Absorbers

- Made from recycled material
- Easy to install on ceilings
- Custom shapes and sizing
- Various colors
- **Class A fire rated**



Acoustic Wood

Acoustical Sound Absorbers

- Provides wood finish aesthetic
 - Various plank and board style options
- Wall and Ceiling installations
- Various veneer options
- Class A fire rated



The ABCs of Acoustics

Categories of Acoustic Products Simply Explained

Absorbers



Composites

Barriers

Categories of Acoustic Products Simply Explained

- Blocks noise from transmitting between areas
- Combines mass, flexibility, and limpness
- Efficacy measured using Sound Transmission Class (STC rating)
- Includes:
 - Walls (Metal & Curtain)
 - Doors
 - Windows
 - Mass Loaded Vinyl
 - Enclosures



Sound Barriers

ABCs of Acoustics



Flexible Barrier

Walls

Industrial/Architectural



Reinforced Flex Barrier

Walls

Industrial/Architectural



Clear Flex Barrier

Walls

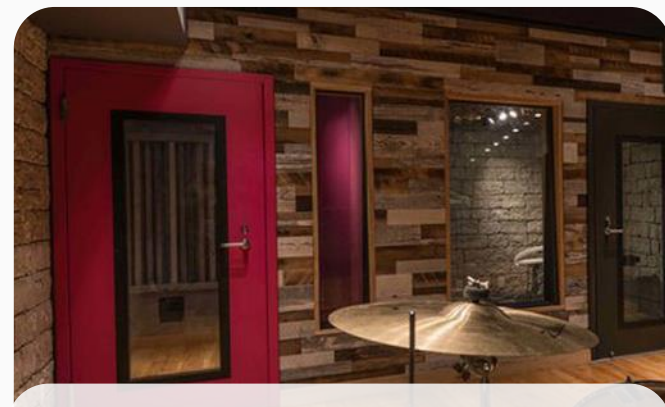
Industrial/Architectural



Metal Barriers

Walls

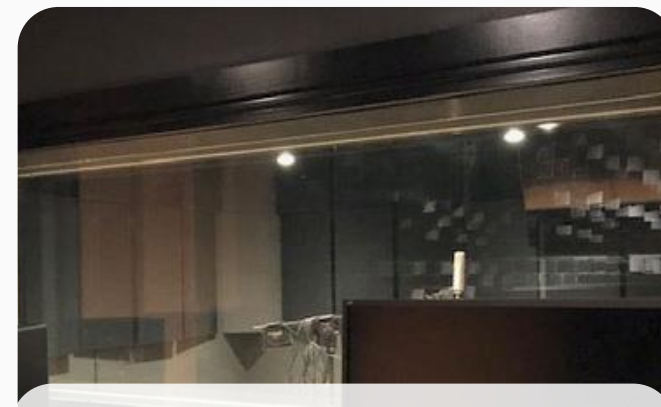
Industrial



Acoustic Doors

Walls

Industrial/Architectural



Acoustic Windows

Walls

Industrial/Architectural



Enclosures

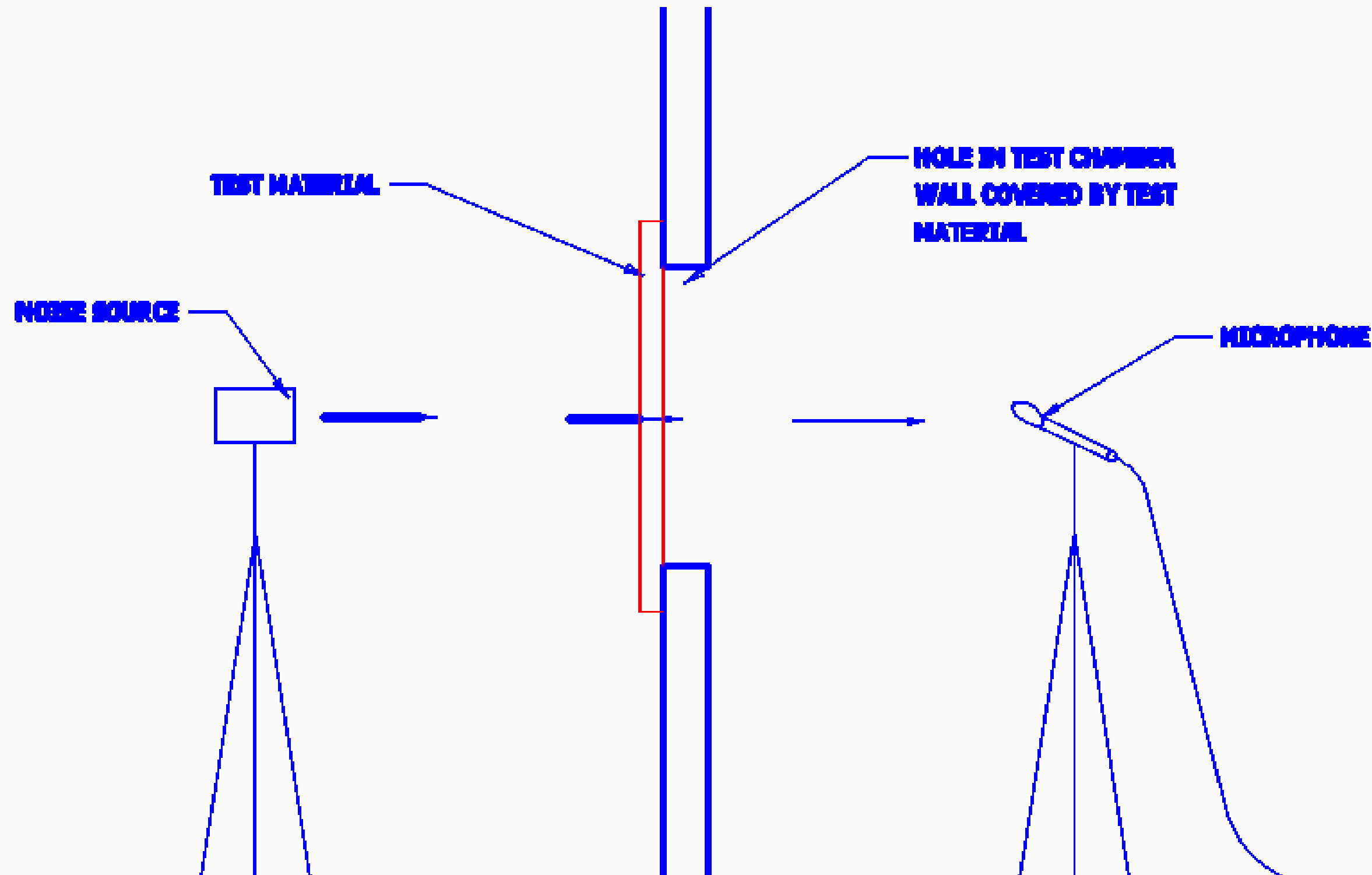
Walls | Ceiling

Industrial

Barriers

Categories of Acoustic Products Simply Explained

Standard Test Method for Sound Transmission (Per ASTM E 90)



Barriers


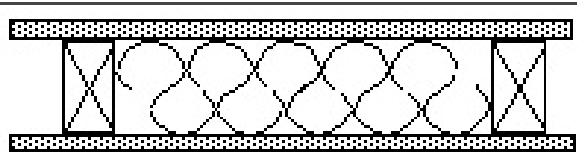
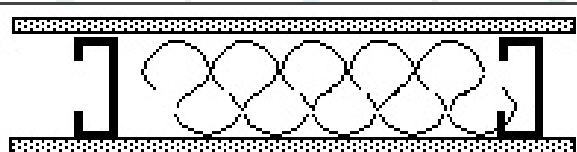
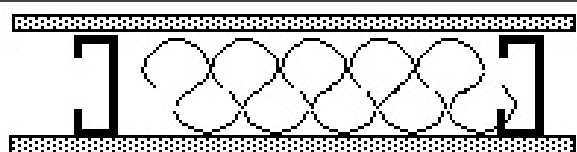
Categories of Acoustic Products Simply Explained

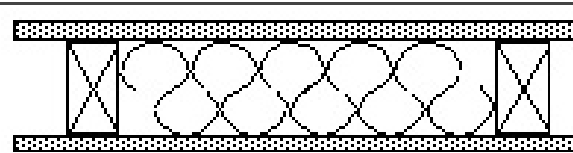
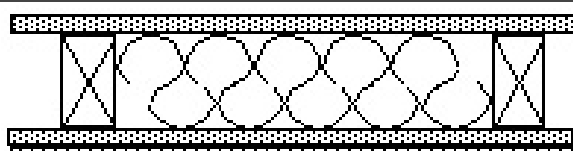
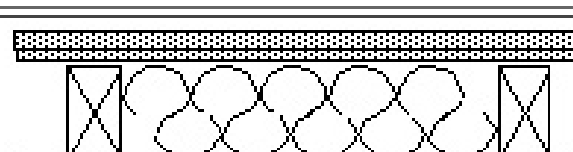
Sound Transmission Classification (STC) Test Results

Freq. (Hz)	Sound Transmission Classification
125	13
250	17
500	22
1000	26
2000	32
4000	37

STC = 26

STC Ratings for Common Partitions

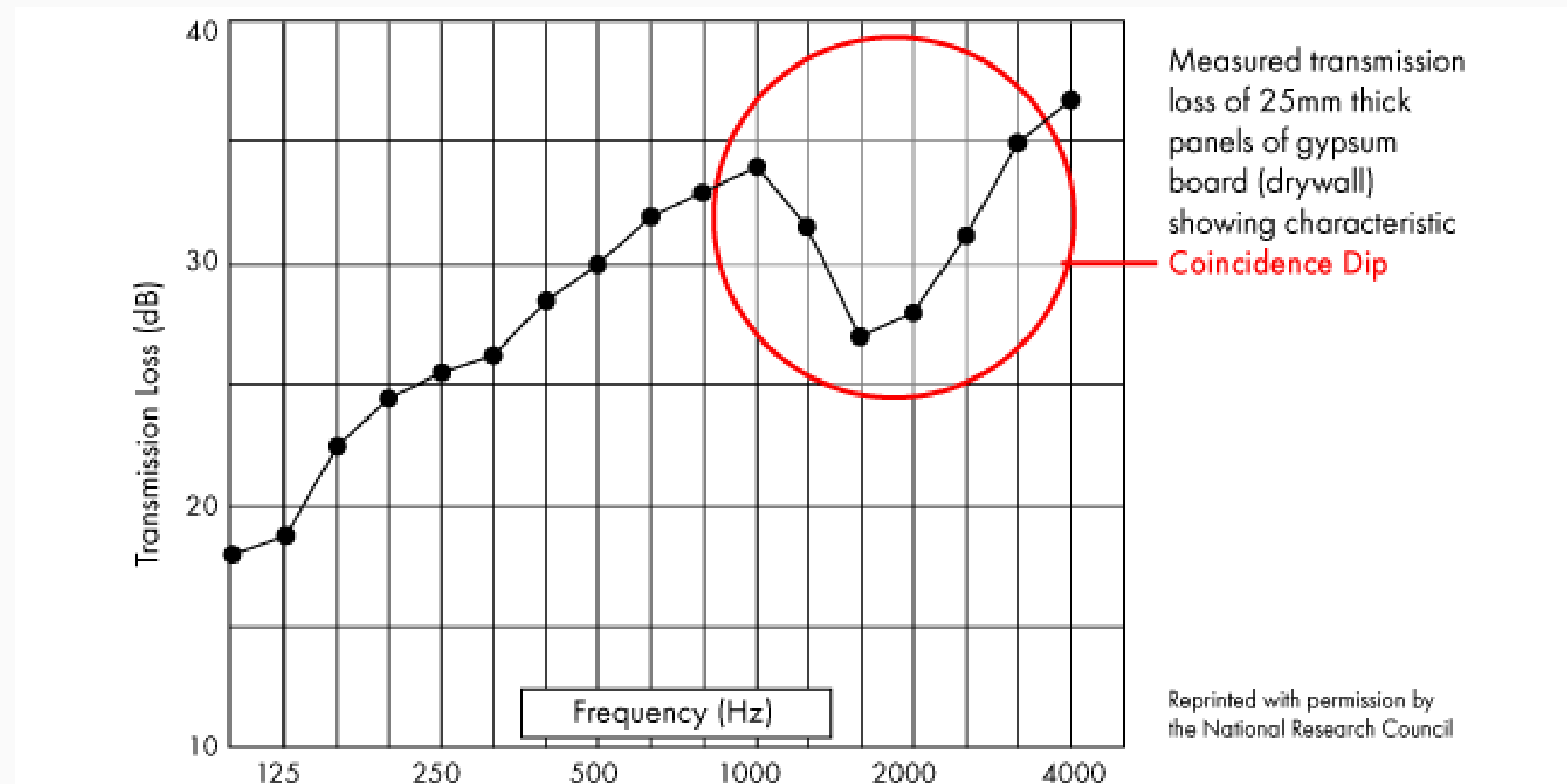
Description	Estimated STC Rating	Wall Assembly	Description	Estimated STC Rating	Wall Assembly
3 5/8" metal studs, 5/8" gyp (2 layers total), No insulation	38 - 40		2x4 stud, 5/8" gyp (2 layers total), Batt insulation	34 - 39	
3 5/8" metal studs, 5/8" gyp (2 layers total), Batt insulation	43 - 44		3 5/8" metal studs, 5/8" gyp (2 layers total), Batt insulation	43 - 44	

Description	Estimated STC Rating	Wall Assembly
2x4 stud, 5/8" gyp (2 layers total), Batt insulation	34 - 39	
2x4 stud, 5/8" gyp (3 layers total), Batt insulation	39 - 40	
2x4 stud, 5/8" gyp (4 layers total), Batt insulation	43 - 45	

The Mass Law

Phenomenon whereby doubling the mass per unit area of a panel, or doubling the frequency for a given mass per unit area, increases the sound transmission loss by five-six decibels

- The higher the density of a material is, the more unlikely it vibrates when influenced by sound wave.
- Everything has a frequency at which the mass law doesn't apply, called the coincidence dip.
 - Use dissimilar products to fill that dip.
 - For example, 5 layers of sheetrock will all "dip" at the same frequency. Using barrier will fill in that dip



Mass Loaded Vinyl Barrier

Categories of Acoustic Products Simply Explained

Comes in a variety of options

- Non-reinforced
 - Reinforced
 - Clear View
 - Specialty Options
-
- 1/2 Lb psf to 2Lb psf
 - STC up to 31



Non-Reinforced Noise Barrier

Categories of Acoustic Products Simply Explained

- Low Cost
- Used between drywall and studs
- Used as septum material in composites
- Used to line inside A/C curbs
- Can be used underneath carpet
- Can be dyed colors in cases where visible



Non-Reinforced Noise Barrier

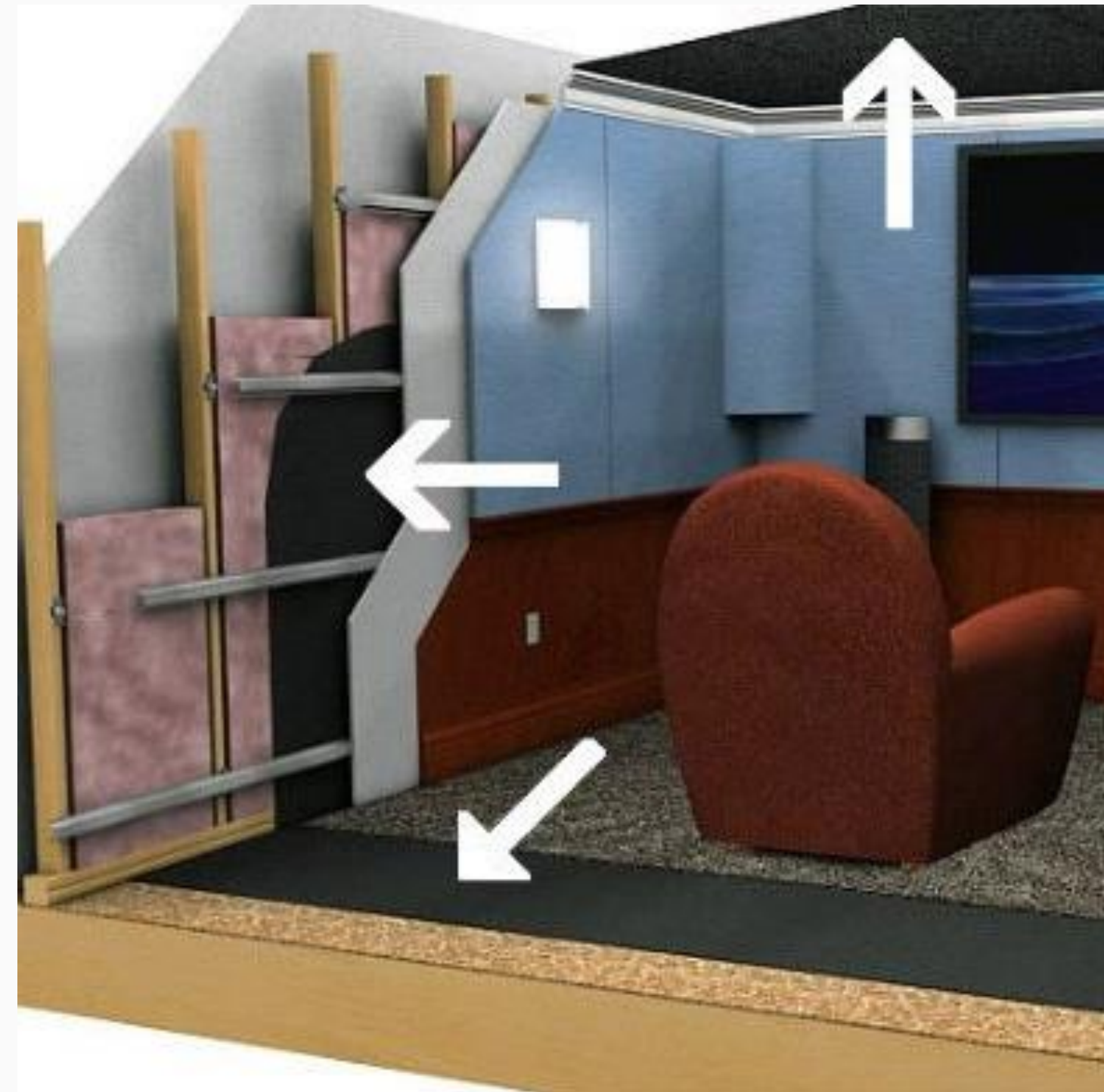
Categories of Acoustic Products Simply Explained

Wall Application

- Noise Transmitting through walls
- Standard stud & sheetrock construction
- Easy installation
- Can also be applied over existing drywall with an additional layer of drywall

Provides:

Increase transmission loss of wall assembly



Non-Reinforced Noise Barrier

Categories of Acoustic Products Simply Explained

Ceiling Application - Noise Barrier Ceiling Tile Covers

- Used when overhearing conversations from adjoining spaces
- Existing "Acoustical" drop ceiling tiles

Provides:

- Reduced transmission of crosstalk noise
- Bonded to 1" fiberglass decoupler
- Die cut to fit over standard T-grid systems
 - 2'x2' or 2'x4'

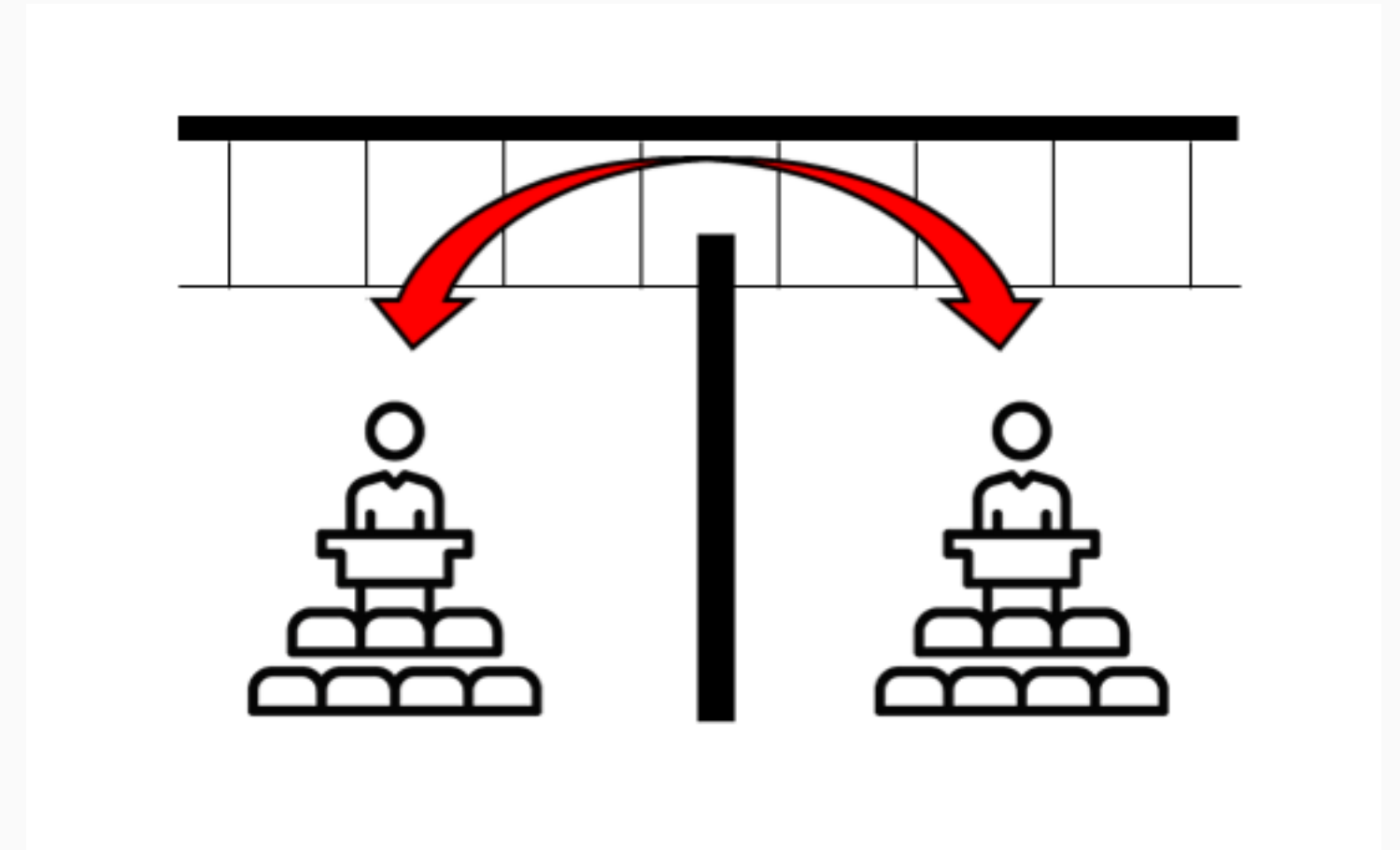


STC vs. CAC

Ceiling Attenuation Class

Ceiling Attenuation Class (CAC) is a measure for rating the efficiency of a ceiling system as a barrier to airborne sound transmission between adjacent closed spaces that share a common air plenum.

- The higher the CAC rating, the better the performance. A ceiling system with a CAC less than 25 is very low performance, whereas a ceiling with a CAC of 35 or greater is considered high performance.
- CAC test is also known as a double passthrough test
 - STC is a single passthrough
- A lower STC rating is often better than a higher CAC rating.
 - Ex. STC 23 > CAC 35
 - There is no calculation to compare STC and CAC



Reinforced Noise Barrier

Categories of Acoustic Products Simply Explained

- Suitable for outdoor use
 - UV and Weather Resistant
- Strong and tear resistant
 - Tensile strength 1470 psi
 - Shore "A" hardness 85 +/- 3
- Cast in place vs. internally reinforced
- 140 mph wind tunnel test
- USDA approved for incidental food contact



Reinforced Noise Barrier

Categories of Acoustic Products Simply Explained

Application - Outdoor Mechanical Equipment

- Suitable for outdoor use
- No absorption/NRC rating required
- Economical

Provides:

- Containment of noise from mechanical equipment's
- UV and Weather resistance

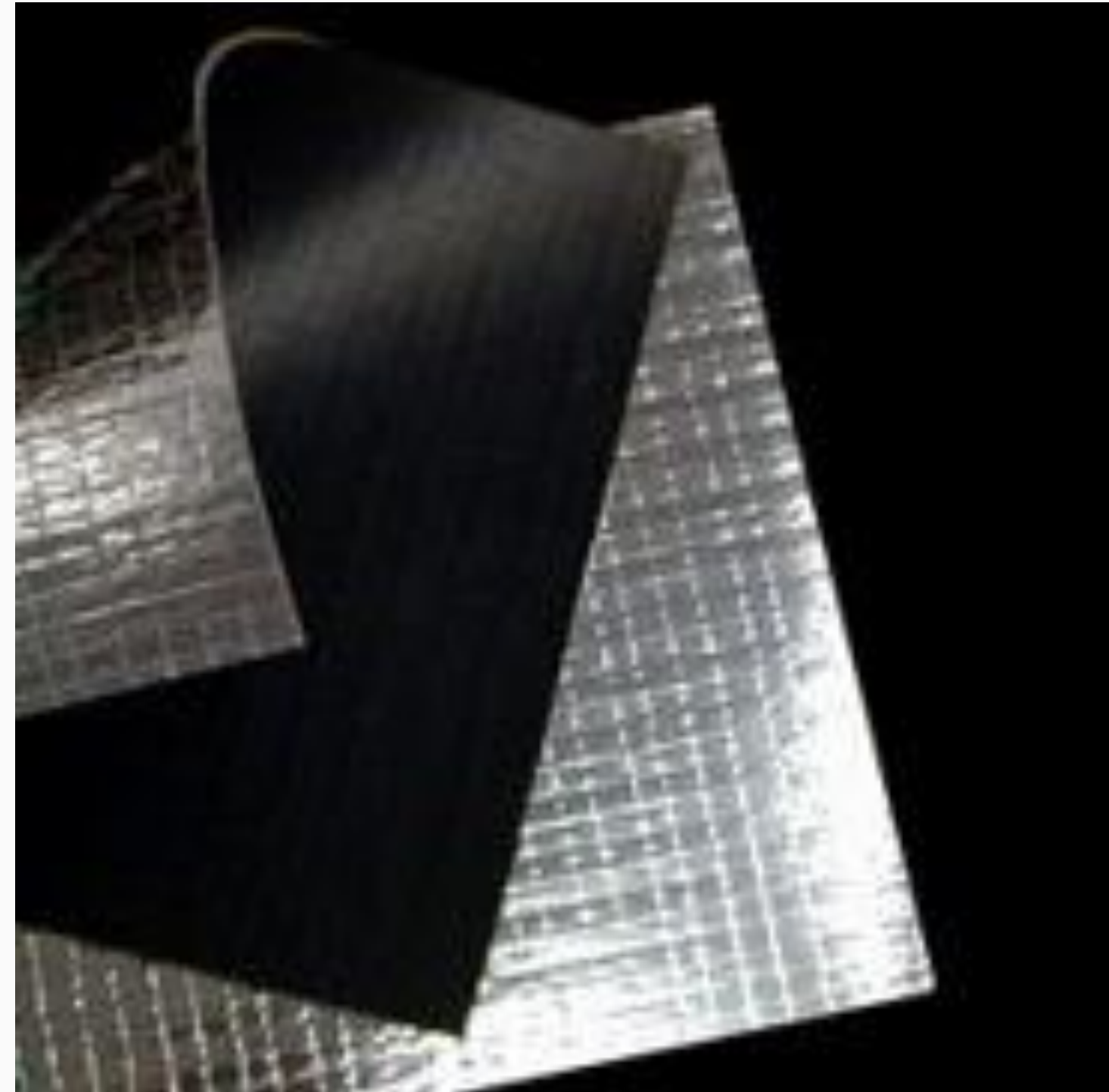


Lag Barriers

Categories of Acoustic Products Simply Explained

Acoustical Pipe & Duct Lagging

- Multi layered material
 - Reinforced foil facing
 - Noise Barrier
- Accepts foil tape for easy installation
- Available in 1Lb psf and 2Lb psf
- Commonly combined with quilted fiberglass decoupler



Lag Barriers

Categories of Acoustic Products Simply Explained

Application - Water Facility

- Problem
 - Built in residential area
 - Noise levels exceeded community ordinances for background noise

Provides:

- Lag Barrier w/ quilted fiberglass
- Suitable for outdoor use
- 12 dB(A) noise reduction
- Instituted "Good Neighbor" policy



The ABCs of Acoustics

Categories of Acoustic Products Simply Explained

Absorbers

Barrier

Composites

Composites

Categories of Acoustic Products Simply Explained

- Combines absorbers and barriers
 - Mass loaded vinyl & quilted fiberglass
 - Acoustic Masonry, Concrete w/ fiberglass
- Offers most significant overall noise reduction
- In factory settings, most efficient product option
- Efficacy measured using both NRC and STC ratings
- Generally used where aesthetics are not of concern
 - Around noisy machines
 - Safety/OSHA purposes
 - Interior & Exterior Applications



Composites

ABCs of Acoustics



Barrier Backed

Walls
Industrial



Barrier Septum

Walls
Industrial



Acoustic Curtains

Walls
Industrial



Composite Enclosure

Walls
Industrial



Metal Panel Enclosures

Walls
Industrial



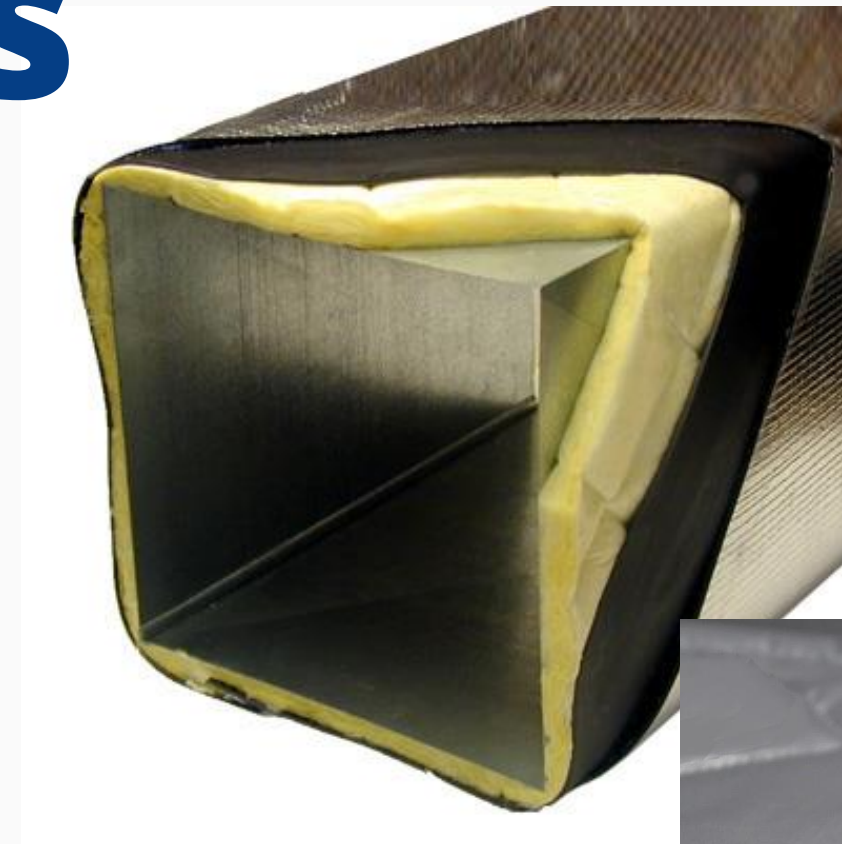
Acoustic Masonry

Walls
Industrial/Architectural

MLV Composites

Categories of Acoustic Products Simply Explained

- **LAG Composite**
 - Reinforced-foil faced barrier
 - Bonded to quilted fiberglass decoupler
- **Barrier Backed Composite (BBC)**
 - Loaded vinyl barrier backed
 - Bonded to a quilted fiberglass sound absorber on one side
- **Barrier Septum Composite (BSC)**
 - Fiberglass sound absorber
 - Loaded vinyl barrier septum



MLV Composites

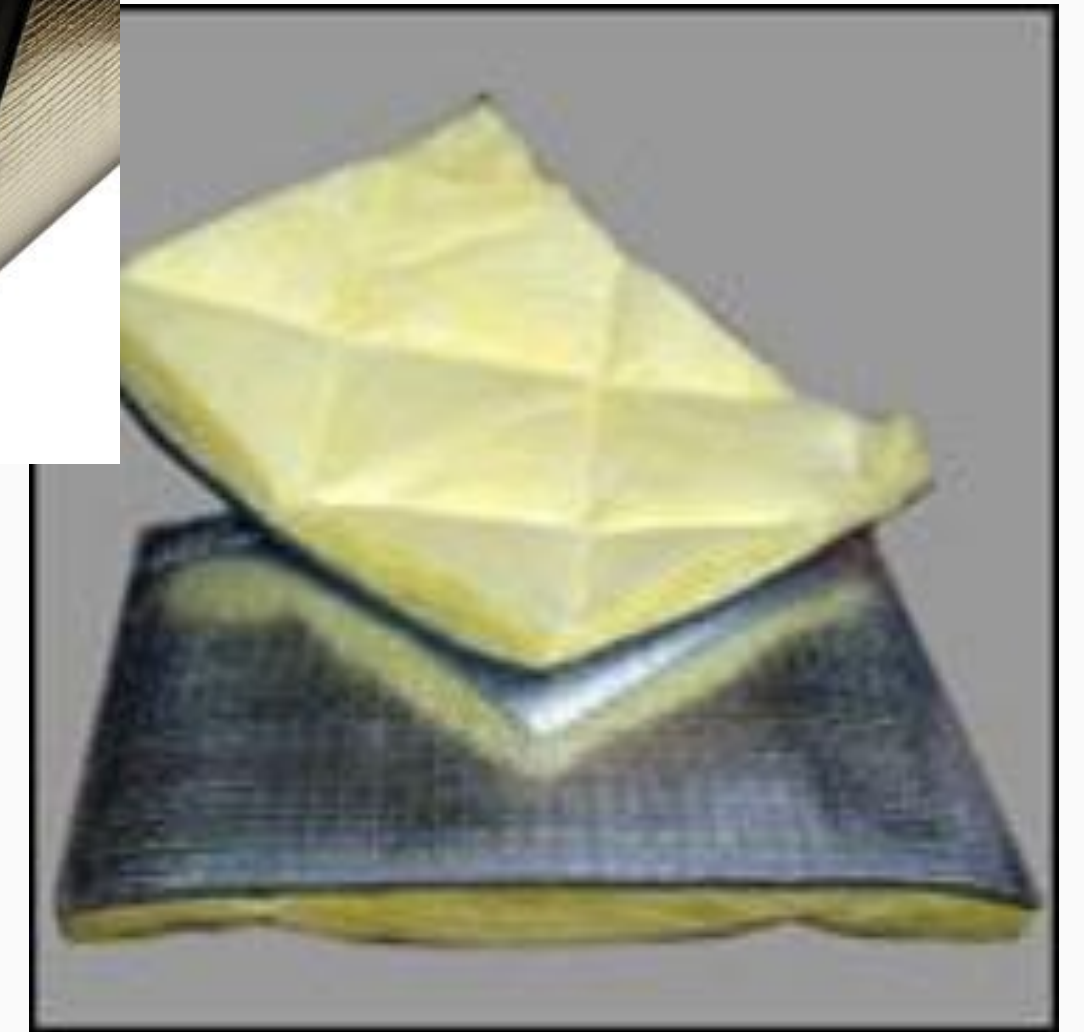
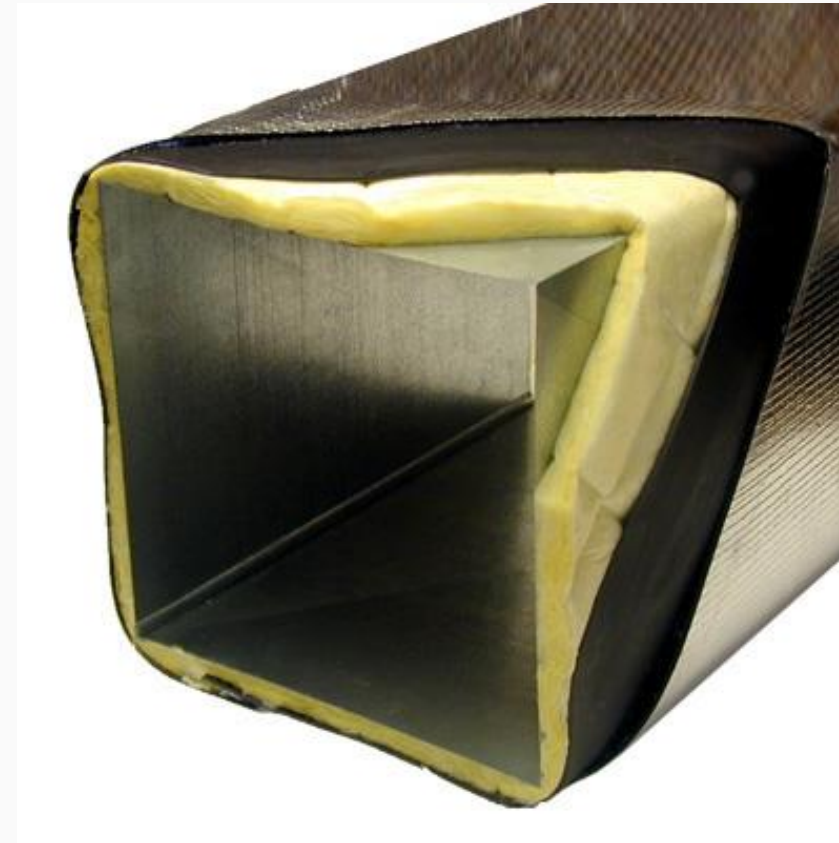
Categories of Acoustic Products Simply Explained

Decoupler- In acoustics, a material used to separate a noise barrier from a surface

- Allows noise barrier to maintain flexibility
- Optimize noise barrier performance

Common Decouplers

- Fiberglass
- Polyurethane or melamine foams
- Cork
- Rubber
- Neoprene



Barrier Backed Composite

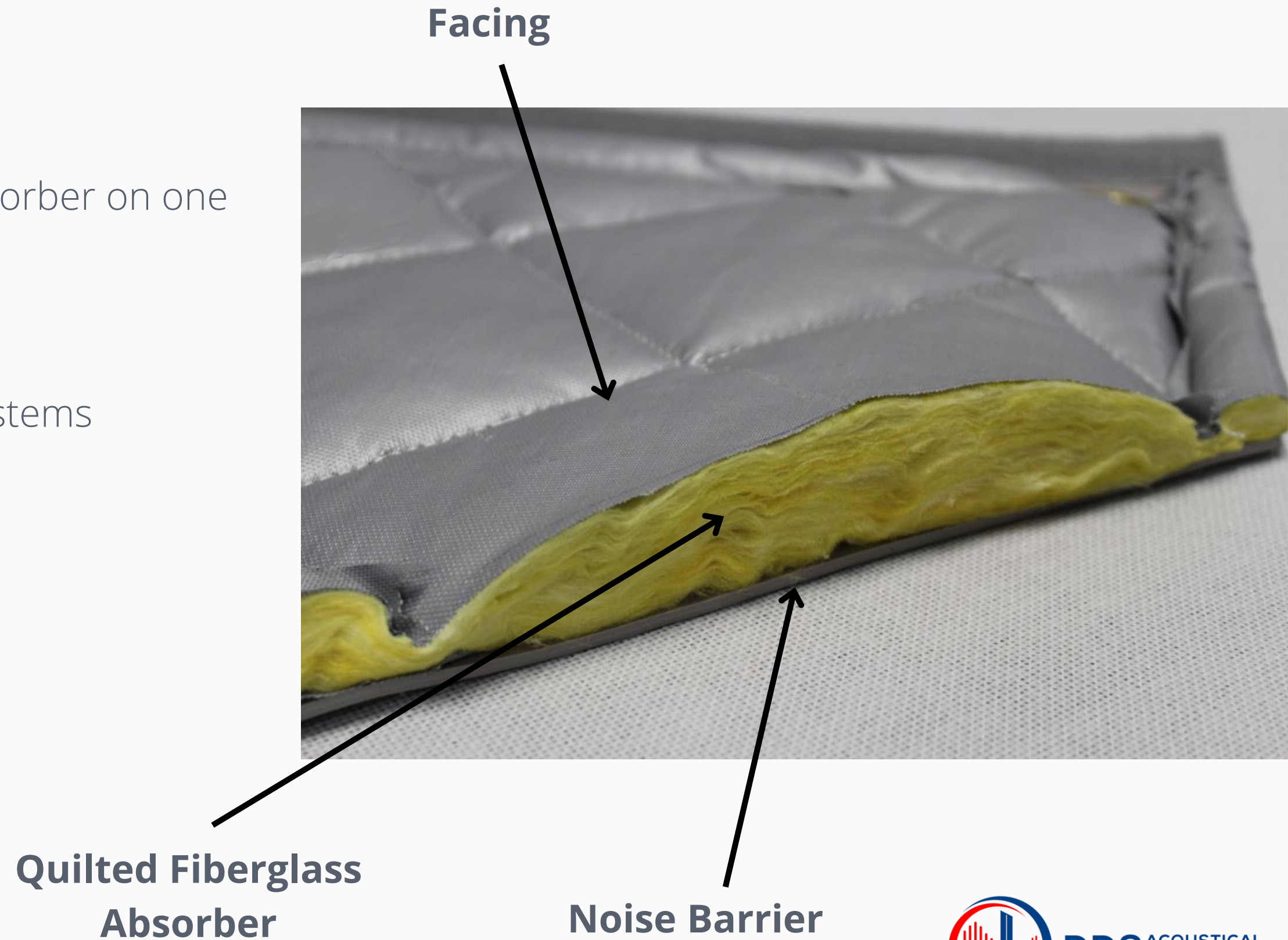
Categories of Acoustic Products Simply Explained

Barrier Backed Composite (BBC)

- Loaded vinyl barrier backed
- Bonded to a quilted fiberglass sound absorber on one side

Applications:

- Sliding "doors" in acoustical enclosure systems
- Abuse resistant and durable
- High traffic areas
- Acoustical jacket/wrap
- Exterior use



Barrier Backed Composite

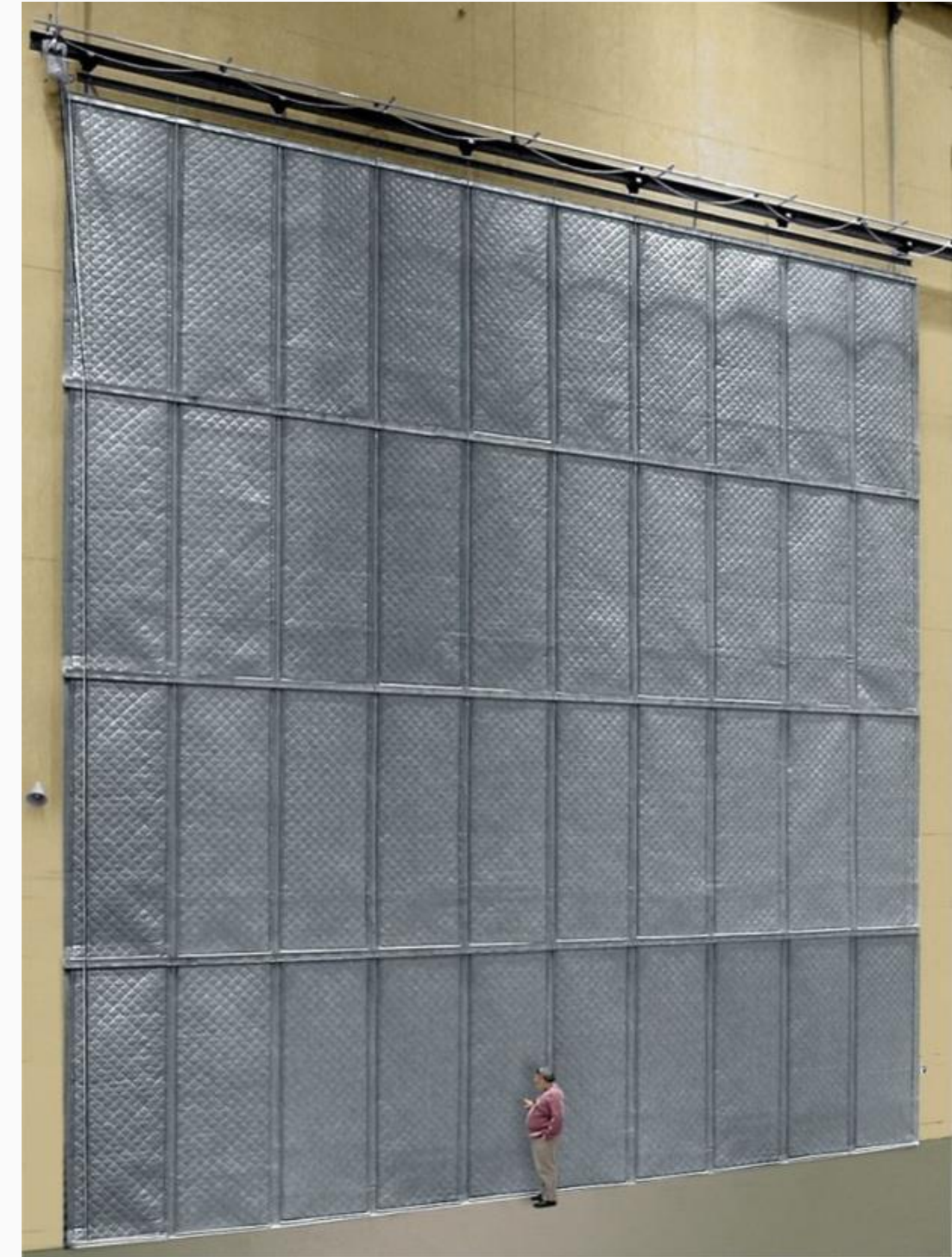
Categories of Acoustic Products Simply Explained

Application - Transformer Testing Area

- Problem
 - Needed a cost-effective solution to a sliding door that blocked noise from testing area
 - Traditional acoustical metal doors were cost prohibitive

Solution:

- 2" Barrier Backed Composite panels
- Made into sliding doors with multiple tiers
- STC 32
- NRC .85



Barrier Septum Composite

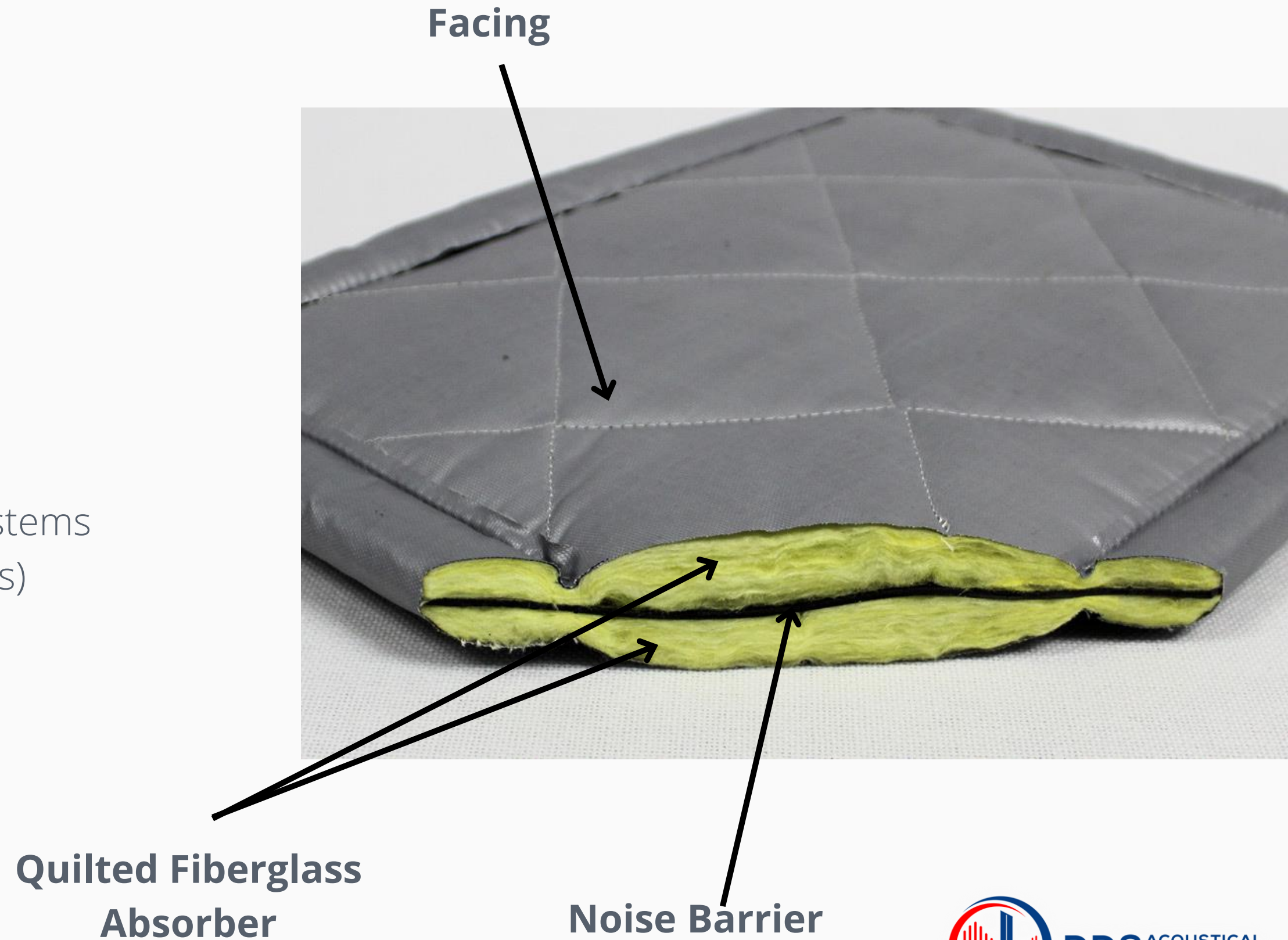
Categories of Acoustic Products Simply Explained

Barrier Septum Composite (BSC)

- Fiberglass sound absorber
- Loaded vinyl barrier septum

Applications:

- Acoustical room liner
- Separator/Divider panels
- Free hanging acoustical wall
- Acoustical curtain panels in enclosure systems
- Acoustical door panels (pre-existing doors)



Barrier Septum Composite

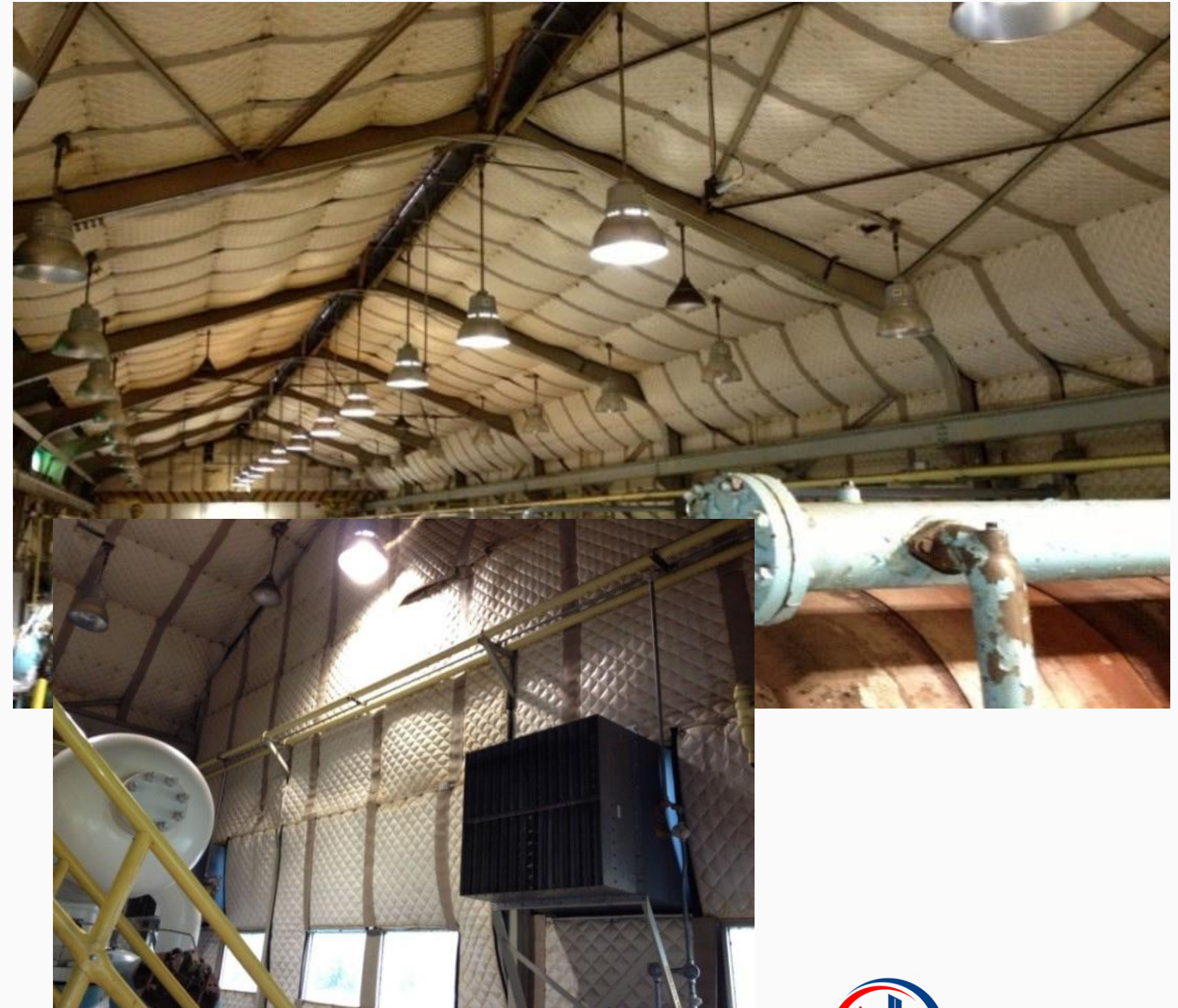
Categories of Acoustic Products Simply Explained

Application - Lining a Compressor Building

- Problem
 - Property line noise levels too high
 - Excessive interior noise levels
 - Expansion could not take place until issues resolved
 - Employees needed double ear protection

Solution:

- 2" Barrier Septum Composite panels
- Lined the ceiling & walls of building
 - Caddy clips used for installation
- 15 dB(A) reduction at property line
- 10 dB(A) reduction INSIDE building



Enclosures

Containing Noise Sources

All enclosure systems can contain:

- Ventilation
- Windows (using MLV clear flexible noise barrier)
- Variety of configurations
- Entryways

Full Enclosures

- Containing a noise source on all sides (walls, floor, ceiling)
- Can incorporate acoustical entryways

Partial Enclosures

- Typically made of 2-3 walls
- Used when noise doesn't need to be blocked on all sides
- Maintains access area

Portable Enclosures

- Built with locking casters
- Combinable using velcro tabs
- Not as effective acoustically
- May not be cost effective
- Better used in small shops

Curtain Panel Enclosures

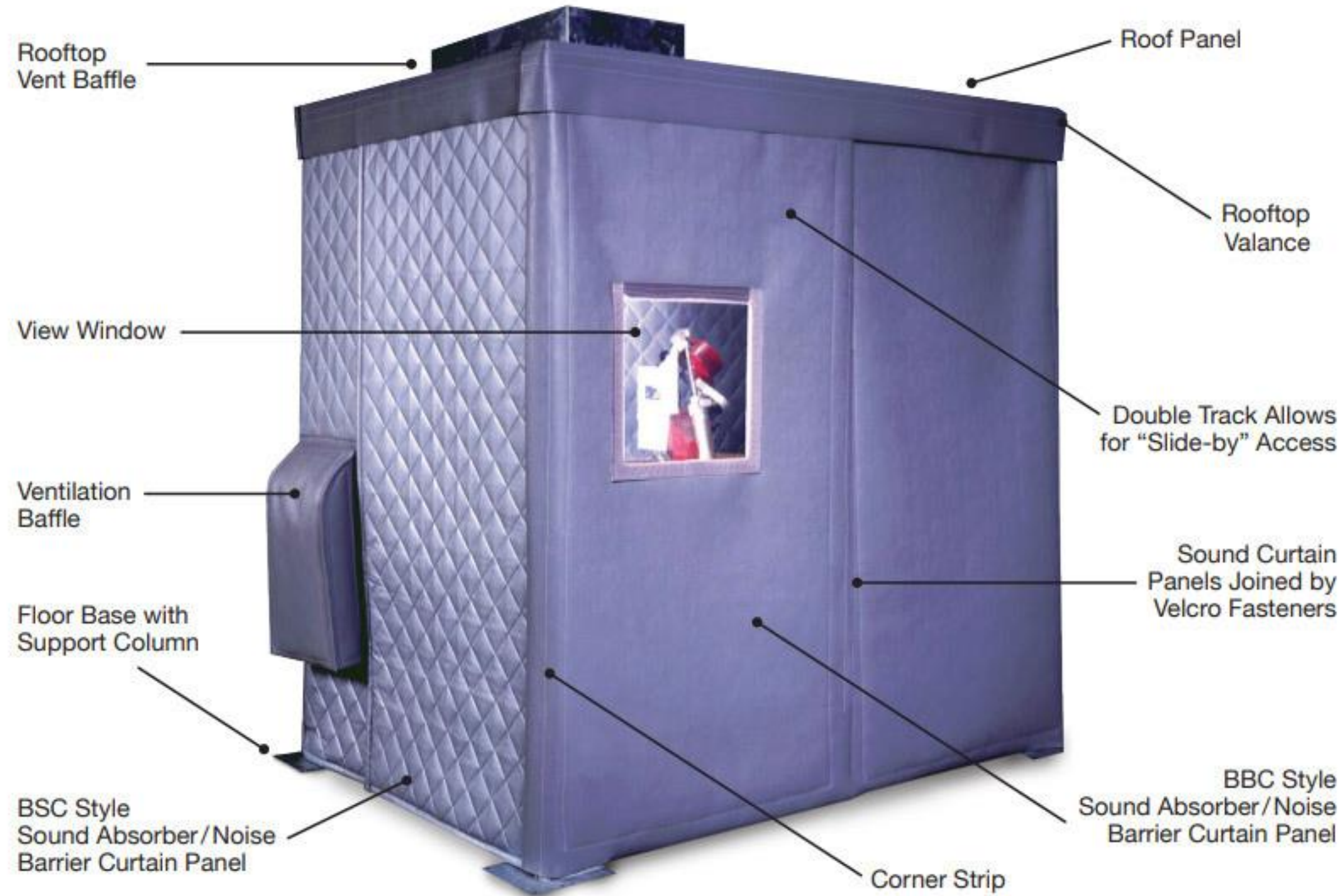
Containing Noise Sources

Best Use Cases:

- When desired noise reduction is 10-22db
- More Economical than Metal Enclosures
- Easy Installation or Tear Down
- Can be permanent or temporary



Curtain Panel Enclosure



Portable Curtain Enclosure



Curtain Panel Enclosures

Containing Noise Sources

Application - Waste Water Treatment Plant

- Problem
 - Multiple blowers requiring maximum ventilation
 - 97 dB(A) noise level
 - Needed access to each blower separately

Solution:

- Double track for access
- BBC perimeter panels
- BSC divider panels
- 14 dB(A) reduction



Metal Enclosures

Containing Noise Sources

Best Use Cases:

- When desired noise reduction is 25+db
- Best for Low Frequency Noise Reduction
- Galvanized or Stainless Steel
- Permanent Applications



Metal Enclosures

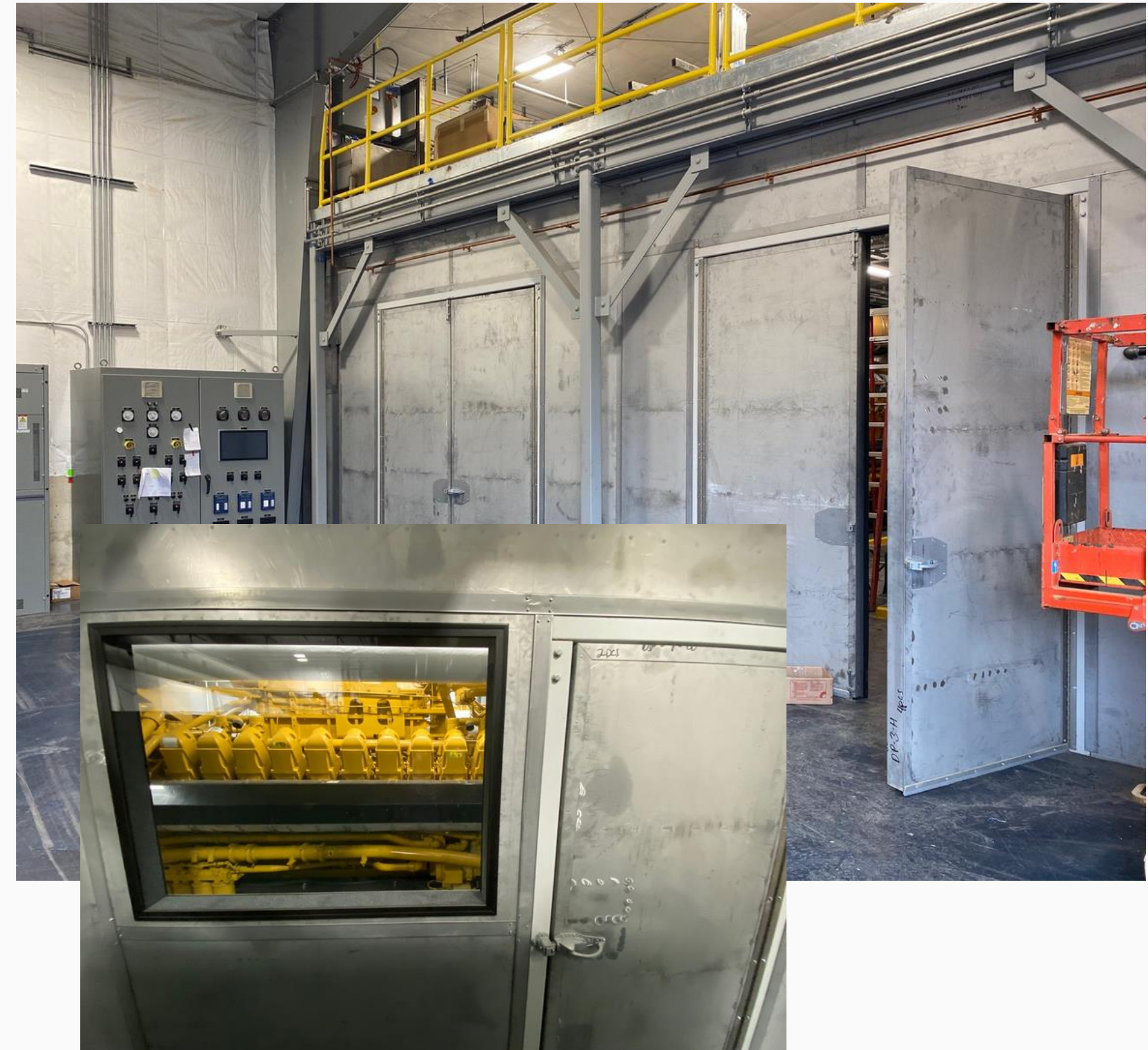
Containing Noise Sources

Application - Energy Generators

- Problem
 - Close proximity to residential apartments
 - Needed to ensure compliance with local noise ordinances

Solution:

- Metal Barrier Wall enclosure with operable access doors and acoustic windows
- BSC curtain panels lined interior walls
- Ventilation silencers
- Noise at property line = 65db
 - Approximately a 40db reduction



HVAC Silencers and Louvers

Noise Control for Air Handling Systems

- Custom Engineered
- Maximum Air Handling and Minimum Pressure Drop
- Maximum Attenuation of Low Frequencies
- Forward and Reverse Flow
- Significant Noise Reduction



Machine Vibration Isolation

Uses recycled rubber pads beneath concrete blocks to create a resilient system

Factors to consider:

- Machine Weight
- Machine Footprint
- Disturbing Frequency
- Max Static Load
- Max Dynamic Load





DDS ACOUSTICAL
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THANK YOU

QUESTIONS?

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