



ACOUSTICAL TREATMENT SOLUTIONS

ENSURING QUALITY SOUND FOR MORE EFFECTIVE MUSIC EDUCATION



Traditional Acoustic Panel series
Dynamic Acoustical Panel series
VAE® Rehearsal System

UNDERSTANDING CRITICAL LISTENING

The study of music is dependent upon the ability to learn and hear differences in intonation, dynamics, articulation and balance. This skill, called critical listening, can be developed only in a learning environment with proper acoustics.

Wenger Acoustical Treatment Systems promote critical listening and effective music education. The information in this brochure will help you understand how you can effectively put these treatments to work in your facility to ensure successful music education.

If your music space has proper cubic volume, Wenger panels can tune the acoustics to perfection. But when room size is too small, sound reflections return too quickly for musicians to properly hear the sound they create, resulting in a lack of envelopment. In these environments, no combination of panels can completely compensate for the lack of cubic volume. But, the right combination of Wenger acoustical panels can enhance acoustics by increasing your room's ability to accommodate big sound in a small space.

Protect Yourself from Hearing Loss

Rooms without adequate space to dissipate and absorb the loudness generated by musical ensembles can have dangerously high sound-pressure levels. Concert bands, marching bands, orchestras, and jazz bands generate especially high levels. In fact, according to OSHA standards*, 90 decibels (dB) is the maximum acceptable level of noise in a workplace. Yet sound levels in band rehearsal rooms reach peak levels that are often 7 to 12 dB higher than the standard, an alarming find when you consider that every 6 dB equates to a doubling of sound. No wonder that, in a recent study, 20% of K-12 choral and band instructors showed signs of noise-induced hearing loss.

Ringling ears after a day of rehearsals is an indication that there is too much strain on your hearing. It's a serious problem often overlooked, even though severe consequences can happen quickly. At 115 decibels, permanent hearing damage can occur after just 15 minutes. And, because we all react to sound differently, a sound level that one person might consider tolerable may be damaging to someone else.

*OSHA bases its standard on continuous exposure to noise. And though music directors are more often subjected to less prolonged periods of sound, they are still at risk if subjected to such high levels

DECIBEL LEVEL EQUIVALENTS

Faint 30-40 decibels	Moderate 50-70 decibels	Very Loud 80-100 decibels	Extremely Loud 110-130 decibels	Painful 140-170 decibels
whisper library	conversation business office	fire crackers street traffic	rock concert jack hammer	airplane pain threshold

Wenger Acoustical Treatment Systems can help by absorbing and diffusing damaging levels of sound. It's smart to monitor the loudness of all your rehearsal facilities and evaluate the risk to yourself and your students. Please feel free to call us at Wenger any time you have questions or would like additional information.

The chart below shows typical problem areas that can be remedied by Wenger Acoustical Treatment Systems, thus creating an environment in which real learning can be achieved through listening.

TYPICAL ACOUSTICAL PROBLEMS

Problem area	Effect on acoustics
Rooms with limited cubic volume	Overwhelming loudness; lack of presence; dangerous conditions
Low ceilings	Reduction in cubic volume and its consequences
Poured concrete risers	Unnecessary reduction of room volume and increased loudness
Untreated parallel walls	Create an annoying ringing or buzzing sound, called flutter echo
Multi-angled walls	Create hot spots and dead spots if not properly designed, in which case construction costs may be prohibitive
Visual acoustics (i.e., curved walls and domes that look to have good acoustical properties but are more often detrimental to the acoustic environment)	A myriad of problems, including hot spots, dead spots, and echoes
Square or cube-shaped rooms with parallel walls	Create additive wave lengths, called standing waves, that over-emphasize certain frequencies, making them abnormally loud
Instrument storage cabinets with solid doors in the rehearsal room	Reduction in cubic volume (they should be kept outside of rehearsal rooms, if possible, or outfitted with grille doors)
Excessive soft finishing materials (i.e., carpet, drapes, upholstery)	Absorption of higher frequencies, but not lower frequencies**
Excessive hard finishing materials (i.e., concrete, tile, hard wood)	Harsh reflection of sound; minimal absorption, very loud

**Note: In rooms that only utilize high-frequency absorption, flutes, violins, sopranos and other high-frequency sounds, including the high overtones of most instruments, can be lost; intonation, articulation, and timing can be blurred; and critical listening becomes impossible. Similarly, the remaining low frequencies become overpowering, and acoustics within the environment will lack clarity and become loud and boomy.

SOLUTIONS THAT ENHANCE CRITICAL LISTENING

To achieve critical listening, the music environment must have the proper combination of absorption and diffusion, which control excessive loudness and diffuse sound throughout the space, thereby improving acoustics. Wenger Acoustical Treatment Systems are based on these principles.

Absorption

Sound absorption can generally be defined as the reduction of sound energy that occurs when sound comes into contact with various surfaces and materials. When sound strikes a hard, dense surface, such as a gymnasium floor, there is nominal absorption. When sound comes into contact with thick, fibrous materials, such as acoustical panels, a great deal of sound energy can be absorbed, and less sound is reflected back toward its origin.

Diffusion

Sound diffusion can generally be defined as the scattering and redirection of sound caused when sound comes into contact with acoustically reflective surfaces. Diffusion of musical sound is necessary so that the music can be clearly heard from all points in a facility. The ornamentation, columns, and plaster work in historic theaters, for example, provide many angled, acoustically reflective surfaces which result in excellent diffusion.

Different music environments require varying degrees of absorption and diffusion, depending upon their shape, volume, etc. Wenger Corporation professionals work to achieve the right balance of absorption and diffusion to create the ideal music-learning environment, where musicians can hear the music as they play it. In these effective environments, proper reverberation times are attained to give instructors a more accurate account of student performance and progress.



PASSIVE

Traditional Acoustic Panel Series

- The ideal combination of absorber and diffuser panels creates an acoustically balanced environment
- Flutter echo, excessive reverberation, and boomy sounds are eliminated.
- Loudness is controlled and balanced over the full audible range.
- Performers hear themselves and others.
- Instructors hear balance with accuracy.



DYNAMIC

Dynamic Acoustic Panel Series

Wenger Corporation's Dynamic Acoustical Panel Series allows the same wall-mounted panel to adapt from absorption to diffusion with the simple turn of a handle changing reverberation time by up to .8 seconds. It's the multi-purpose solution to room acoustics. Wenger can now acoustically design your new or existing space into one that's appropriate for both instrumental and choral rehearsal (yes, the same space).



ACTIVE

VAE® Rehearsal

Wenger Corporation's Virtual Acoustic Environment technology is acclaimed for its ability to simulate different acoustic environments in a sound-isolation room. Now that technology can be applied to an entire rehearsal room. Our specialized system of microphones and speakers can be controlled by a simple keypad. And the system can be customized to simulate your Performance Space (your auditorium, gymnasium or competition venue).

PASSIVE

TRADITIONAL ACOUSTIC PANEL SERIES

Each panel is tuned to a particular acoustical task

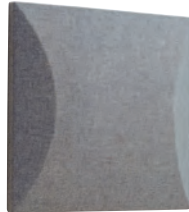
The Traditional Acoustic Panel Series provide a traditional “fixed” acoustical treatment solution to a specific instrumental or choral rehearsal room. It includes the ideal balance of absorption and diffusion, and each solution is unique, based on the shape, cubic volume and type of group using the rehearsal space. Their placement, mix and size must be analyzed according to the room and the type of group that practices in the space.

Wall Acoustical Panels



Absorber Panels

Suited for a wide range of music environments. Designed to reduce the reverberation and loudness of a room. Engineered to absorb sound across a broad frequency range for effective, balanced abatement.



Type I Convex

Diffuser Panels
Designed to scatter and blend sound, these panels diffuse middle-to-high-range frequencies that define timbre and articulation.



Type II Convex

Diffuser Panels
Significantly larger than Type I panels, but with the same shape. In addition to sound-diffusion qualities, they selectively absorb low-frequency sound.

Ceiling Acoustical Panels



Convex Diffuser Panels

Impact-resistant diffuser panel. Lay-in or ceiling mount applications in 2' x 2' (610 x 610 mm) or 4' x 4' (1219 x 1219 mm) sizes.



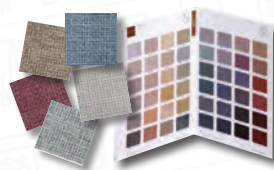
Quadratic Diffuser Panels

Engineered to provide the most effective diffusion in the 750 Hz to 3300 Hz range. These 4' x 4' (1219 x 1219 mm) diffusers are designed as easy-to-apply ceiling in-lays.



Pyramid Diffuser Panels

Impact-resistant ceiling diffuser panels feature an offset pyramid shape to treat specific acoustical applications. Ceiling mounts in 4' x 4' (1219 x 1219 mm) or 2' x 2' (610 x 610 mm).



Environmentally responsible

Fabric made of 100% recycled material

“In our new performing arts center, Wenger designed and installed the optimal configuration of acoustic panels for our three rehearsal rooms and recital hall. The results are amazing!”

Jim Probasco

Music Coordinator
Kettering City School District, Kettering Ohio

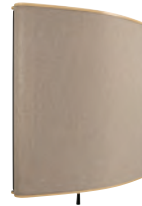
DYNAMIC

DYNAMIC ACOUSTIC PANEL SERIES

Wenger Corporation has taken rehearsal room acoustics to a new level — Level “WOW”



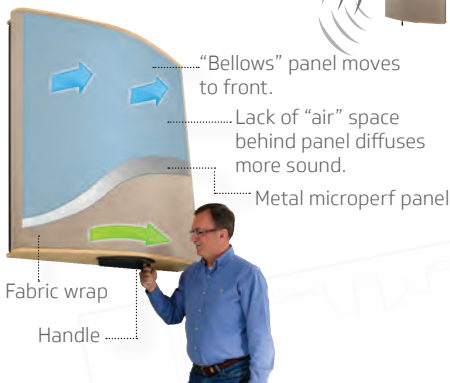
Dynamic Acoustic Panel Series are available in two sizes 4' x 4' (1219 x 1219 mm) and 4' x 8' (1219 x 2438 mm) panels. An Absorber only and Diffuser only panel is also available in the same configuration to make all panels look identical. Several fabric options and woodgrain cap finishes are available.



How do you create the optimal acoustical space for vocal and instrumental music in the same room with the same acoustical panels? Impossible – until now. Wenger Corporation’s Dynamic Acoustical Panel Series is an innovative design that adjusts its absorption and diffusion capability to create a “flexible” room acoustically. The panel changes as quickly as you can turn a handle. Turn to the left and the panel becomes an absorber – turn to the right, and it becomes a diffuser. It takes just seconds, so you can tune your room between classes or after school, or whenever your students rehearse. The exterior shape of the panel always stays the same, providing a clean, professional appearance. Now you can turn your rehearsal room into a flexible space without sacrificing the acoustics. No more scheduling conflicts for rehearsal spaces. Have a shared rehearsal room for band and choir? Wenger Corporation’s Dynamic Acoustical Panel Series is the perfect solution!

Diffusion Mode

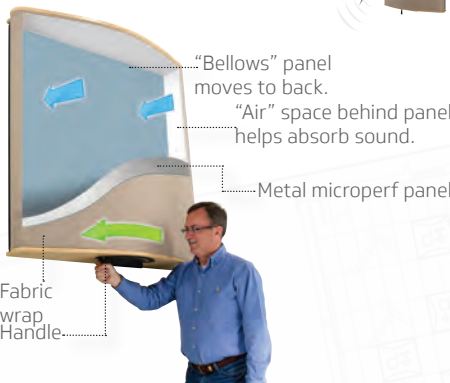
Reflects sound waves for improved blending of sound



Sliding the handle to the right puts the panel in Diffuser mode.

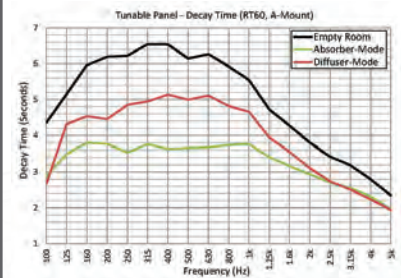
Absorption Mode

Absorbs sound waves to lower sound level.



Sliding the handle to the left puts the panel in Absorption mode.

Certified Test Lab Results



Provides up to .8 seconds of change in reverberation time. Test is actual independent lab test conducted by Riverbank Labs.



“The acoustical treatment has really changed our rehearsals; my students are excited to hear the difference. Band comes alive when you’re able to hear and analyze everybody’s part.”

Anthony H. Bailey
Band Director
Hart High School, Santa Clarita, CA

ACTIVE

TAKE YOUR MUSICIANS ON AN ACOUSTICAL FIELD TRIP

You can now completely modify the acoustics of your classroom with the push of the button



Practice where you perform! Now you can simulate nine different acoustic environments in your rehearsal room at the push of a button. Wenger Corporation can also program custom simulations of your auditorium or a competition venue. Your students benefit by being able to practice in an environment before they perform there. You control the entire system of microphones and speakers from a simple keypad.



VAE® REHEARSAL SYSTEM

TRANSPORT AN ENTIRE REHEARSAL ROOM TO THE AUDITORIUM AND BACK BEFORE THE BELL RINGS

Easing the transition from the rehearsal to the performance environment allows students to focus more on the skills and habits they've developed in rehearsal and less on the unfamiliar performance space. VAE Rehearsal comes with the same capabilities as all our VAE systems and includes the ability to be programmed to simulate the acoustics of your own auditorium.

School auditoriums are heavily scheduled places. So trying to find time for your choral and instrumental groups to practice on stage can be difficult. The same goes when you are preparing for a special occasion in a large performance venue. Practicing in the dry environment of your rehearsal room can be limiting – unless you have VAE Rehearsal.

“From the beginning, part of my interest in the VAE Rehearsal system was the ability to have a “Wayzata Auditorium” setting. The Wenger acousticians and engineers measured the acoustic environment in our auditorium and emulated that in our rehearsal room, making a smooth transition for our young musicians. Now when we're rehearsing in our orchestra room, we can feel like we're rehearsing on our stage. Or we can choose an acoustically drier environment if we like. The VAE Rehearsal gives us many options.

Mark Gitch
Orchestra Director
Wayzata High School, Plymouth, Minnesota



HERE ARE JUST THREE OF THE NINE RICH ENVIRONMENTS THAT VAE CAN TAKE YOU TO:



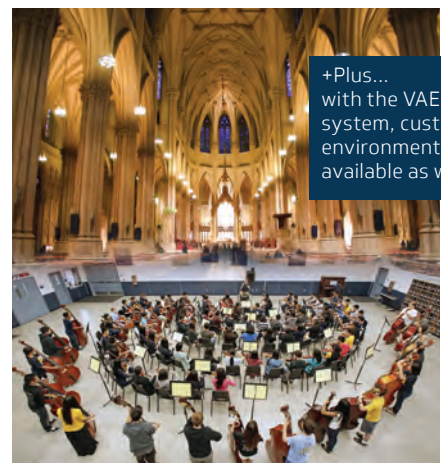
Baroque Room

Expand the breadth of your musicians' sound to mimic the open and reflective space of a baroque hall.



Large Auditorium

Preparing for an important performance that takes your students to a Professional venue? Let VAE show your group what this large volume of space does to their sound!



Cathedral

It's a special occasion when your group can perform in such an impressive space. VAE can help you prepare for the unique acoustics found there.

+Plus...
with the VAE Rehearsal system, custom environments are available as well!

ACOUSTICAL PANELS AND ACOUSTICABINETS™

IN THE REHEARSAL ROOM

Proper acoustics are essential in music education environments, enabling the development of critical listening skills. As one part of an overall acoustical solution, AcoustiCabinets are ideal for situations where instrument storage cabinets are located within a rehearsal room. The encapsulated acoustically absorptive material built into the back of the cabinets provides specific acoustical benefits by absorbing a broad range of sound frequencies.



Without Any Treatment

A rehearsal room without any cabinets or acoustic treatments will have excessive loudness, flutter echoes and could possibly cause hearing loss over extended periods of time.



With Ordinary Storage Cabinets

A rehearsal room with instrument storage cabinets succeeds in diffusing some sound but has little effect in quieting loudness or absorbing high and low frequencies.



With Wenger Corporation AcoustiCabinets

A rehearsal room with Wenger Corporation's AcoustiCabinets and used in conjunction with absorber and diffuser panels can create an acoustically balanced environment. Loudness is controlled and balanced over the full audible range.

“The acoustics in my band room are good - much better than my former band room. Even with my 100-piece marching band in there, the sound level is pretty comfortable. There's not as long of a delay, which is nice. When I make a cutoff, the sound doesn't ring for six or seven seconds afterwards. I can also hear better because the sound is getting diffused correctly. I love the AcoustiCabinets - I wish we had more.”

Brent Morrison, Band Director, Otsego High School, Otsego, Michigan

Wenger®

CORPORATION

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Music Education



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