



TecVision Nano Perf XT1300X White shown above.  
Photography: Kevin Winzeler Photography , Park City, Utah.

- The ideal position for the main speaker is behind the screen, and on the same level as the right and left speakers.

Whether you're installing a home theater system, or AV in a corporate or commercial environment, the proper setup for the sound system ensures the highest quality results. The ideal position for the main speaker is behind the screen on the same level as the right and left speakers. This maintains:

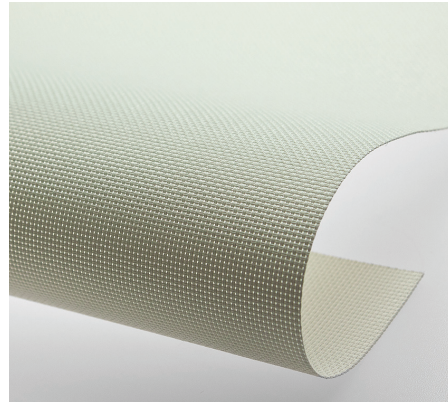
- Quality sound localization for the dialogue and overall sound effects;
- Movie theatre quality that is true to the original sound mixing engineering; and
- The ability to use identical speakers due to space restrictions and avoid interference with other objects on the floor or ceiling.

However, placing the center speaker directly behind a standard projection screen means there will be some sound loss. The solution is an acoustically transparent screen; that is, a projection screen with a weave or with tiny holes to allow the sound to pass through ... much like the cloth over a speaker. These acoustically transparent screen surfaces allow audio and video to interact seamlessly, creating the ultimate experience.

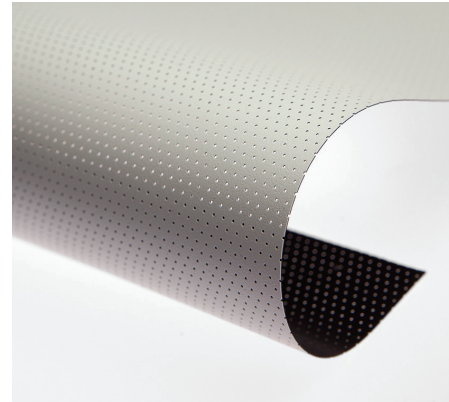
## ACOUSTICALLY TRANSPARENT OPTIONS

Draper provides a range of acoustically transparent solutions in our ClearSound viewing surface family. Below are descriptions of each; on a later page you will find charts outlining the acoustic performance of each surface.

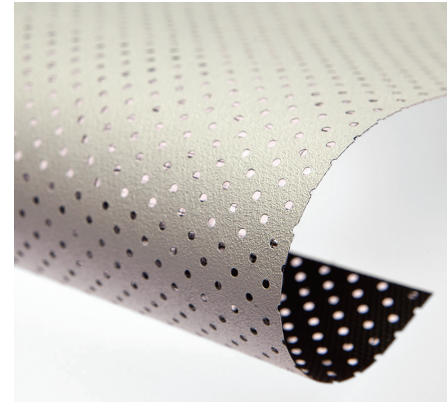
*(continued on next page)*



Woven materials are the most innovative and versatile acoustically transparent front projection screen materials available



The perforation diameter for Nanoperf surfaces is 0.381mm (0.015"). There are 203 holes per square inch.



Standard perf diameter is 1.12192mm (0.048"), and there are 25 holes per square inch.

**ClearSound White Weave XT900E/Grey Weave XH600E**

Draper was the first manufacturer to introduce woven acoustically transparent screens. Until then, only perf materials were available. ClearSound White Weave XT900E and ClearSound Grey Weave XH600E continue to be the most innovative and versatile acoustically transparent front projection screen materials available. With over 76,000 microscopic openings per square foot, both the White Weave XT900E and Grey Weave XH600E have the sound transmission characteristics of high quality speaker grille cloth. There is also little impact on the image, with less than 6% light loss. Woven surfaces are not recommended for viewing less than 10' from the screen.

**ClearSound NanoPerf XT800V**

Microscopic perforations in the fabric create an acoustically transparent surface that does not compromise audio quality when speakers are placed behind the screen, while providing a beautiful image. The projected image is gorgeous, with a full 180° viewing cone and accurate color reproduction. Ideal for home theatre and commercial uses, even rental/staging. Openings in this type of surface are smaller and more numerous than standard perforated surfaces, allowing viewing distances of 10 feet or more and improved acoustics.

Nanoperf is also available with all ISF-certified, 8K-ready TecVision formulations.

**ClearSound Perf XT900V**

Flexible black-backed matt white perforated surface. Reasonable control of ambient light is recommended. This surface is well suited for larger screens and larger spaces. Due to the size of openings in this surface type it is not recommended for viewing less than 20' from the screen.

**ClearSound Perf XT950E**

Textile backed matt white perforated surface. This surface is well suited for larger screens and larger spaces. This is very similar to what is used in movie theaters. Due to the size of openings in this surface type it is not recommended for viewing less than 20' from the screen.

**MINIMUM SIZES**

Draper does not recommend using any of our acoustically transparent surfaces in sizes smaller than 80 inches wide. This is due to moiré patterns. If the projector is too close to the screen, pixels won't line up properly.

**TEST PROCEDURE**

A review measurement of the acoustically transparent materials was performed by engineers at Auralex Acoustics in Indianapolis, Indiana. For the ClearSound White Weave XT900E and ClearSound Grey Weave XH600E, a Klipsch loudspeaker was positioned in a semi-anechoic test room such that it simulated a center-channel configuration in a typical theater setup. An Earthworks omnidirectional microphone was placed 24" from the loudspeaker. Wideband (20-20,000 Hz) pink noise was played through the loudspeaker using the Goldline Audio Toolkit DVD. The third-octave band levels were measured with the TerraSonde Audio Toolbox analyzer using a Real-Time Analysis (RTA) module.<sup>1</sup>

The overall noise level was set such that the signal-to-noise in the test room was at least 25 dB in all bands of concern. A 30-second average of the sound level was measured and saved with no screen sample in place.

For the other surfaces, a Genelec loudspeaker was positioned in front of an isolation box which contained an Earthworks omni-directional microphone. The isolation box is constructed in order to block out sounds that come from all sides except the front of the box, which is left open. Wideband (20-20,000 Hz) pink noise was played through the loudspeaker and the levels were measured using acoustical testing software in order to set a base level. The overall noise level was set such that the signal-to-noise in the test room was at least 25 dB in all bands of concern.

Using a temporary screen framing apparatus provided by Draper, the screen samples were placed between the loudspeaker and the microphone. The wideband pink noise signal was played again through the loudspeaker and the third-octave band levels were measured and saved for each screen sample. Nominal screen sample size was 64" wide by 36" high. The distance from microphone to screen sample surface was -18". (Note: Different screen-to-loudspeaker and/or screen-to-microphone distances yielded no significant changes in the measured results.)

**WHAT DOES IT ALL MEAN?**

Charts below and on the next page outline how each of Draper's acoustically transparent screen materials performed in the tests. The amount of sound loss is indicated in decibels (db) as Screen Insertion Loss (IL). For a simple idea of how much loss we are talking about, here are a few sound levels for comparison: Breathing is about 10 db, the average library

has a sound level of about 40 db, and an air conditioner unit 100 feet away comes in at about 60 db. Typical radio or TV sound is around 70 db.<sup>2</sup>

Two things are worth noting. First, as can be seen in the graphs on the following page, sound loss through an acoustically transparent screen is pretty negligible. Using the comparative sound levels above, the decibel loss is in most cases a fraction of the sound level of breathing. The other point concerns specifically the frequency of human speech. The frequency of a typical adult male's speech is 85-180 Hz, and that of a typical adult female is 165-255 Hz. In that area, 85-255 Hz., the sound loss is less than a decibel for all Draper acoustically transparent surfaces, so an acoustically transparent screen will have a minimal impact on dialogue.

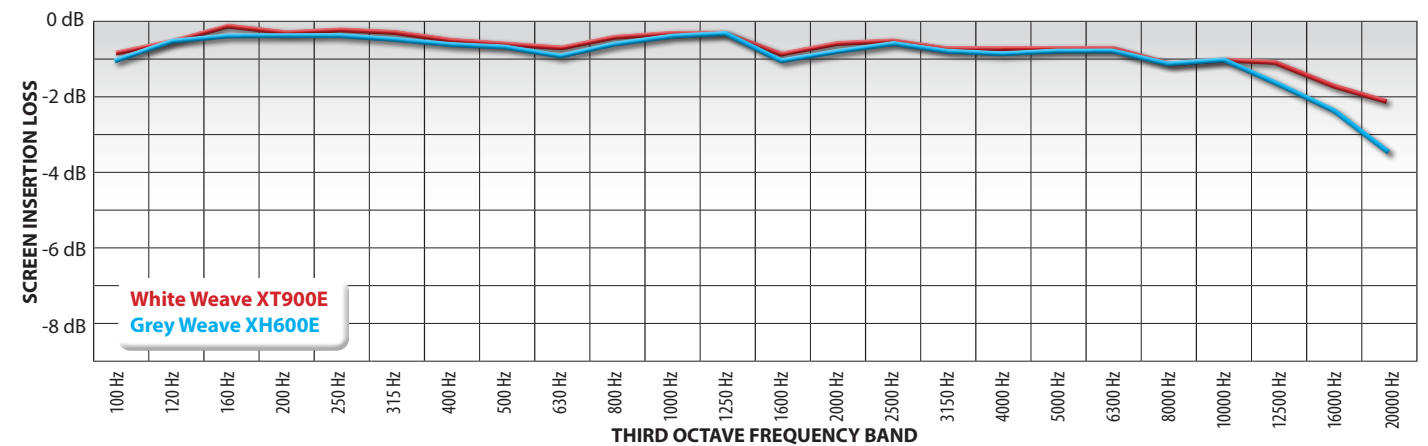
<sup>1</sup>Microphone and analyzer were calibrated to 94 dB (SPL) at 1 kHz. Levels were measured from 25-20,000 Hz, but only the bands of concern for transmissibility are reported, i.e., 100-20,000 Hz.

<sup>2</sup>(Found at: [industrialnoisecontrol.com](http://industrialnoisecontrol.com). SOURCES: Temple University Department of Civil/Environmental Engineering, and Federal Agency Review of Selected Airport Noise Analysis Issues, Federal Interagency Committee on Noise [August 1992]. Source of the information is attributed to Outdoor Noise and the Metropolitan Environment, M.C. Branch et al., Department of City Planning, City of Los Angeles, 1970.)

(continued on next page)

**CLEARSOUND ACOUSTIC PERFORMANCE CHARTS**

**Woven Surfaces**



**ClearSound White Weave XT900E**

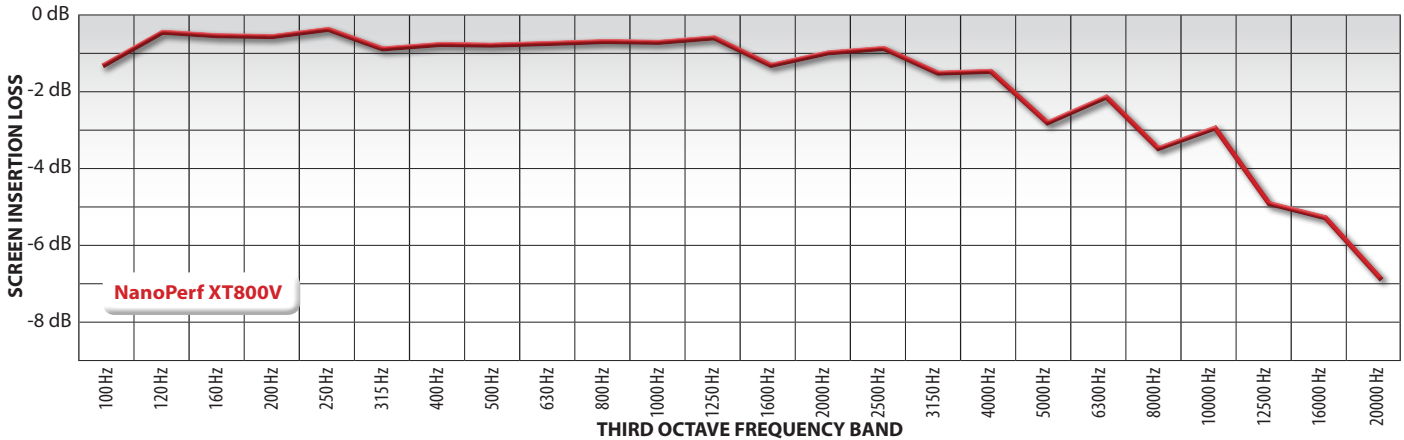
With an average screen insertion loss (IL) of only 0.7 db, and a maximum loss of only 2.0 db found at 20,000 Hz., White Weave XT900E has the best acoustic performance.

**ClearSound Grey Weave XH600E**

With an average IL of only 0.8 db, and a maximum loss of only 2.8 db noted at 20,000 Hz., the performance of Grey Weave XH600E is only a fraction below that of White Weave XT900E.

CLEARSOUND ACOUSTIC PERFORMANCE CHARTS

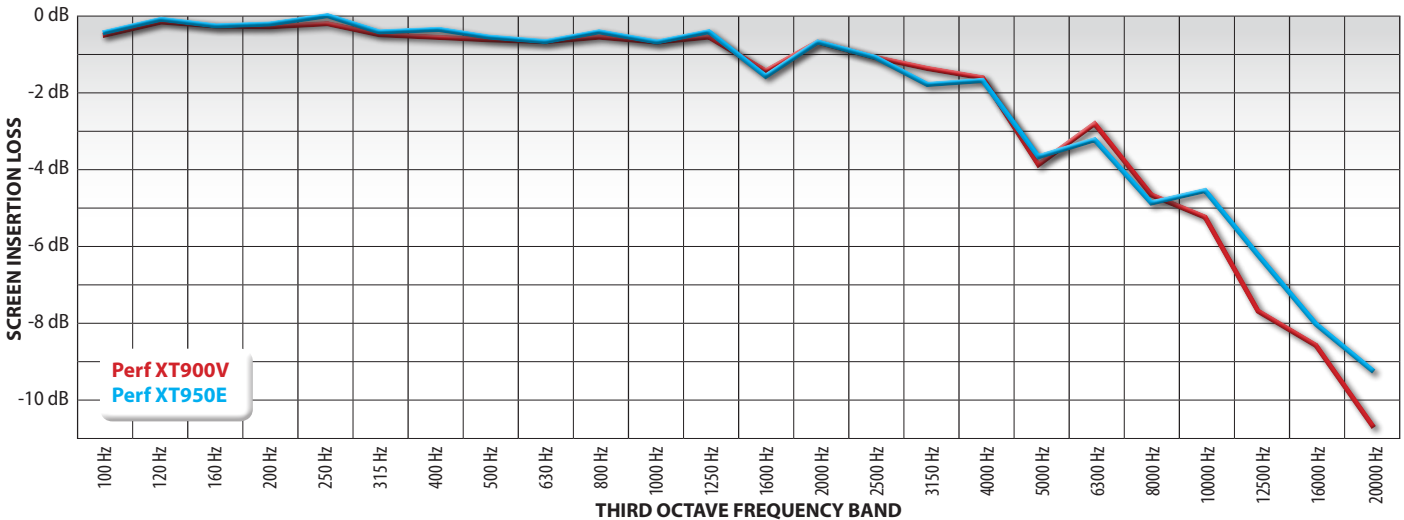
Nano-Perforated Surfaces



ClearSound NanoPerf XT800V

This is a perforated vinyl surface. NanoPerf XT800V (and NanoPerf TecVision) averages 1.7 db IL. The perforation diameter is 0.381mm (0.015”). There are 203 holes per square inch.

Perforated Surfaces



ClearSound Perf XT900V

This perforated vinyl surface averages a 2.2 db IL. The perforation diameter is 1.2192mm (0.048”), and there are 25 holes per square inch.

ClearSound Perf XT950E

This perforated fiberglass surface averages a 2.1 db IL. The perforation diameter is 1.2192mm (0.048”), and there are 25 holes per square inch.