Acoustical Surfaces, Inc. We Identify and S.T.O.P Your Noise Problems Sound Transmission Obscuring Products Soundproofing, Acoustics, Noise & Vibration Control Specialists ™

Acoustical Surfaces, Inc.

SOUNDPROOFING, ACOUSTICS, NOISE & VIBRATION CONTROL SPECIALISTS
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We Identify and S.T.O.P. Your Noise Problem

Coat of Silence Technical Analysis

From the Chemist who created the product:

The total base coat and top coat, a finished coating thickness of about 30 mils, which is about 0.03 or 300 thousandths of an inch. Sound transmission reduction may be achieved through increased mass and thickness, but reflectance and absorption are the key variables that should be considered.

The concept behind the design of this product is the base coat layer that is slightly softer and even "slightly tacky" when dried, with a Top Coat applied that is harder. In my opinion, the combination provides a coating that is both sound absorbing and reflecting. And the mass and thickness of the wall is increased slightly with the application of the products. The Base Coat is considered the "resilient layer", while the top coat is considered to be the "mass layer". A rubber membrane, which is what this paint system is, will restrict sound transmission.

Not only can COS be sold as an added feature in any construction, it is less expensive and easier to install than any other sound abatement wall or soundproofing product in the world. Most sound proofing technology and products are geared for behind-the-wall application. Most sound-proofing products are effective when applied between metal or wooden studs between dry wall. This allows for a loss of sound vibration.
COS is the only product that not only focuses on the sound vibration loss, but also focuses on sound transmission. S on the interior and exterior of a surface and is cost effective for any user.
COS is 100% mold- and mildew-resistant, and a Class A product.

The Amazing facts about COS

SOUND TRANSMISION LOSS (TL) IMPROVEMENT FROM INCREASING WEIGHT

The figure below shows the Sound Transmission Class (STC) ratings for 3-inch-thick dense concrete (12 lb./ft. per inch of thickness) and for three successive doubled thicknesses of 6 inches, 12 inches, and 24 inches.

STC comparison with 12" solid concrete wall:

Wood 2 x 4 / Gypsum with COS

Mass law follows the law of diminishing returns. As shown by the above data, the STC of homogenous construction increases about 5 rating points for each doubling of weight. However, **it is the initial doubling that provides the most**

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practical improvement. Each successive doubling produces proportionally less STC (or TL) improvement per unit weight and a greater increase in cost per unit STC (or TL) increase. **Consequently, complex contractions are required when it is necessary to achieve high STC's and TL improvements,** especially at low frequencies.

Effectiveness of STC Ratings: The following chart estimates what sounds privacy various STC levels provides.

STC	PRIVACY AFFORDED
25	Normal speech easily understood
30	Speech audible, but unintelligible
35	Loud speech understood
40	Loud speech audible, but unintelligible
45	Loud speech barely audible
50	Shouting barely audible
55	Shouting not audible

The Amazing facts about COS

EFFECT OF STIFFNESS ON TRANSMISSION LOSS (TL)

The sound isolation efficiency of materials depends on stiffness as well as mass. For example, the graph below shows TL performance for two plywood layers of equivalent total weight. According to the mass law, the TL performance should be the same. **However, the grooved, less stiff layer has much higher TL performance, especially at mid and high frequencies.**

As shown by the above graph, the coincidence dip can be greater than 15 dB for stiff materials. **This significant difference in TL is caused by the altered response to bending waves, which are excited by the impinging sound energy.** Bending waves are similar to the wave motion in a rope shaken at one end. The exaggerated sketch below shows bending-wave coincidence for a wall.

To achieve high TL performance, use double-walled contractions with wide separation between layers, **light-gauge metal studs instead of wooden studs**, or metal channels to "resiliently" support gypsum board layers.
These elements, if properly installed, **can reduce the stiffness of a barrier. The ideal sound-isolation contraction would be heavy, limp, and airtight!**

Transmission Loss (TL) For Single Walls

The graph below shows Transmission Loss (TL) performance based on equal surface weight for several materials. The curve describing TL performance for single (or homogeneous) walls consists of three basic parts: the low frequency mass-controlled region at about six dB per octave slope; the plateau region of

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relatively constant TL (which depends on bending stiffness and internal damping of the material); and the critical frequency (and mass controlled) region above the plateau, usually at 10 dB per octave slope. Consequently, high-frequency hissing or whistling sounds can be isolated by a material, which allows low-frequency rumbling sounds to be easily transmitted.

The stiffer a wall, the lower the plateau height (which translates to poor sound-isolating performance). Conversely, the limper a material, the higher the plateau height (which produces better sound-isolating performance). As shown by the curves, **lead has the highest plateau height and the best sound-isolating performance on an equivalent weight basis. The more damping a wall has** (i.e., energy loss from internal friction), the narrower the plateau width, resulting in **better sound-isolating performance.** Notice that plywood and lead have far narrower plateau widths than steel. When plywood is struck, it "thuds" because of its internal damping. When steel is struck, it "rings" because it has far less internal damping. For example, sheet metal air-conditioning ducts are poor isolators of sound, and consequently, must often be enclosed by gypsum board when passing through noisy areas.
The TL at 500 Hz of homogeneous materials can be estimated by the formula:
TL = 20 + 20 log G, where TL =transmission loss at 500 Hz (dB) and G = surface density (lb. / ft^2)
Surface densities for common building materials are: brick at 10 lb. /ft^2 per inch of thickness, concrete block at 6 to 12 lb. / ft^2 per inch, plywood at 3 lb. / ft^2 per inch, and plaster at 9 lb. / ft^2 per inch.

INDEPENDENT LAB TEST RESULTS OF STC RATINGS FOR WALL ASSEMBLIES

Description of the Resilient Layer from Science Lab

The resilient layers are one-part, self-curing adhesive formula based on polymers, Formulations are "environmentally friendly" and will contain low or no organic solvents, will have low or no odor, will have no out-gassing, and will contain biocides for mildew and mold resistance, and additives to retard fire.
To achieve the desired properties in the resilient layer, the final base polymer adhesive formulation will yield an as-applied material having an elastic modulus E less than 100 lbs. / sq. inch. Standard additives used in the paints and coatings industry to adjust bulk viscosity, to disperse solids, prevent foaming, regulate flow characteristics, and others will be used as necessary. Biocides and fire retarding agents will be used according to

For this design concept, the applied thickness of the resilient layer formulation may be 0.2" to 0.5" without sagging. It may be applied with trowel, notched

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spreader, brush, roller, or spray equipment. The resilient layer formulation must have good adhesion a variety of existing walls, although surface preparation and primer coating of the walls may be necessary. The resilient layer must be compatible with the outer mass layer, although an intermediate compliant layer could be used. The open time will be greater than 30 minutes, and the time for complete cure
will be less than 12 hours.

Description of the Mass Layer from Science Lab

The mass layers are one-part, self-curing adhesive formulations based on polymers, for example acrylics and urethanes. Formulations are "environmentally friendly" and will contain low or no organic solvents, will have low or no odor, will have no out-gassing, and will contain biocides for mildew and mold resistance, and additives to retard fire.

To achieve the desired properties in the mass layer, the final base polymer adhesive
formulation will be filled with dense additives to increase the bulk weight to 1.5 – 5.0 lbs./sq. ft. Dense fillers will be non-toxic and non-reactive solids, for example barite (specific gravity 4.40) and metal alloys such as Ferro phosphorous (specific gravity 6.53). Standard additives used in the paints and coatings industry to adjust bulk viscosity, to disperse solids, prevent foaming, regulate flow characteristics, and others will be used as necessary. Biocides and fire retarding agents will be used according to manufacturers' recommendations. For this design concept, the applied thickness of the mass layer formulation may be 0.2" to 0.5" without sagging. It may be applied with trowel, notched spreader, brush, roller, or spray equipment. The mass layer formulation must have good adhesion to the underlying resilient layer, although an intermediate compliant layer could be used. The open time will be greater than 30 minutes, and the time for complete cure will be less than 12 hours. After complete cure is achieved, the mass layer will be stiff, impact resistant, paintable, "nail able," crack resistant with aging, and will retain its shape after installation.

*R f m*2 10
≈20log (2ð)

R = noise reduction (dB)
f = frequency (Hz)
m = mass of attached layer per unit area
k = stiffness of resilient layer per unit area ≈ E/h
E = elastic modulus of material of resilient layer
h = thickness of resilient layer.
For