

E.F. SIEGFRIED CO., INC.

"HOT AIR" NEWSLETTER

Welcome! In conjunction with my recent (or forthcoming) visit to your office with the Transonics catalog, this months application column deals with sound attenuator selection and placement suggestions. Also, a reminder about UL555S code and my new e-mail address. Enjoy!

Please distribute to all mechanical designers and engineers



I'd like to let everyone know that if you have any questions you can now **e-mail** me at:
rkugler@efsiegfried.com

If you'd like a personal copy of this newsletter, please send me your e-mail address.



This is a reminder (especially for those of you who did not receive Vol.II of this newsletter) that as of June 1, 2000, **UL555S** (section 6.2) states that **all combination fire/smoke dampers shall have factory installed actuators**. Also note that section 16 has an updated Leakage Classification table (also effective June 1, 2000).



Is 10 feet of lined duct (1" fiberglass) as effective as a 10 foot long sound trap for attenuating duct noise? Luckily (for duct silencer manufacturers at least) the answer is no. **Sound attenuation** is becoming more and more of an issue every day. Where sound traps were once considered luxuries and were often value-engineered out of jobs, engineers and owners are realizing the importance of a **noise-free environment** and its **relationship with IAQ**. With our recently established relationship with **Dynasonics/Transonics, Inc.**, E.F. Siegfried Co. offers a full line of sound attenuation products to address all of your acoustical concerns. This section offers some **general guide lines in selecting a duct silencer** and offers some **advice and suggestions concerning the sizing and placement of these sound traps**.

The first step in selecting a silencer is to do an analysis of the HVAC system. This analysis will determine how much attenuation is needed, in each octave band, to reach your desired NC level for the occupied space. The calculations are done either by the mechanical engineer or an acoustical engineer (if available). This **system analysis** is a detailed process based on ASHRAE methods that I can assist you with if you are not comfortable doing it yourself. The resulting numbers will provide you with the necessary **insertion loss** (acoustical attenuation) for your duct silencer. These numbers will also indicate what style of silencer is required (i.e. broad-band silencer or low-frequency silencer).

In addition, you must also decide if you want a silencer with the standard **lining** (fiberglass or mineral wool) or a more specialized liner. Your choices include the fiberglass

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filler with a **Mylar liner** (these are often used in **cleanrooms and hospitals** where fiber in the air stream is not an option) or a “**packless**” silencer which is totally devoid of any filler material. All of these different liners will also give you different acoustical performances.

Once the type of attenuator to be used and its necessary insertion loss is determined you are ready to select the attenuator. First you must determine the length of the sound trap and the face velocity of the air through your duct. A typical duct silencer catalog sheet includes data for various silencer lengths and face velocities. A **positive face velocity** (+1000 fpm) means that **the air flow and noise are traveling in the same direction**, like most supply fans. A **negative face velocity** (-1000 fpm) indicates a situation where the **noise and air flow are traveling in opposite directions**, such as most return fans (the corresponding insertion losses are different from each other due to the differences in the speed of the sound waves traveling down the duct).

Face velocity and length are probably the two most critical factors in determining the overall performance of the attenuator. The longer you can make the attenuator, the better; the insertion loss can increase significantly as your length increases but the pressure drop only rises slightly. Conversely, the higher your face velocity gets the larger the pressure drop, but the attenuation hardly increases (or actually decreases). Therefore an **ideal attenuator selection consists of a long silencer with a low face velocity** (≤ 1000 fpm is preferred).

Long duct silencers aren't always possible with all duct layouts. If you don't have a long enough straight run of duct you can use an **elbow silencer** (elbow-shaped sound trap) instead. If you stick with a straight silencer, though, make sure that it is **located at least 2 equivalent duct diameters away from any elbow** (inlet or outlet) or the catalog listed pressure drop will increase dramatically (as much as 4X's!).

It is also best to **place your silencer closer to your sound source** rather than the room it is trying to quiet. This is due to the fact that silencers make their own noise when air rushes through them. This is referred to as **self-generated noise** (the silencer manufacturer publishes this information in its catalog). As long as the silencer is located relatively close to the sound source (i.e. your fan), the self-generated noise will be masked by the fan noise and can therefore be ignored. The silencer, however, should never be placed directly on the inlet or outlet of a fan and duct transitions should be as gradual as possible. This is because these conditions promote turbulence which leads to higher pressure drops and self-generated noise. A final note on silencer placement: if you have decided to use a silencer in your supply duct it is important to remember that approximately half of the fan noise is being transmitted down the return duct. Therefore, **two silencers** (one in the supply duct and another in the return duct) **should generally be used**.

Hopefully this information will get you started on selecting the proper duct silencer. Should you need further assistance, call or e-mail me.

Publications that helped with this newsletter and are recommended for reference:

- **Practical Guide to Noise and Vibration Control for HVAC Systems** by Mark E. Schaffer , ©1991
- **ASHRAE Handbook**, ©1999
- **Acoustical Characteristics of Sound Traps** by Jerry G. Lilly, P.E.

Keep a lookout for our next installment!
If you have any questions, call me at 215-887-7244 or
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