TECHNICAL RESEARCH REPORT

LASER VENTING TECHNOLOGY

Why are laser vents superior to mesh vents?

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DUCTSOX® Textile Air Dispersion Products

VENTING TECHNOLOGY

Air distribution in continuous linear vents provides an even airflow throughout an entire HVAC ducting system. This superior method of air distribution has been a standard in the fabric duct industry. The option of using mesh vents (Figure 1) is dated and has a number of drawbacks. Since the mesh vent can only be sized in relatively large increments (typically 0.125”), the accuracy of CFM per linear foot is limited. Also, the size and quantity of the mesh opening creates a higher NC level and subjects the mesh to clogging. Laser venting technology addresses these problems.

Figure 1

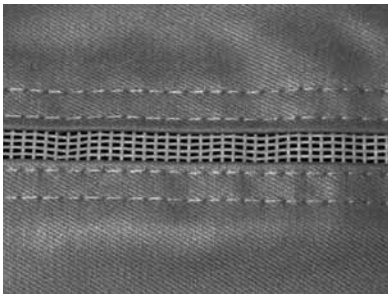
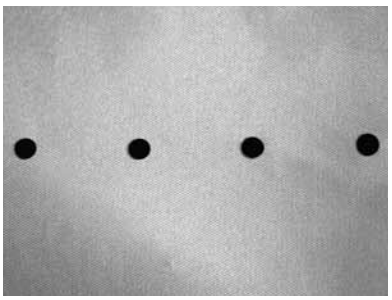


Figure 2



LASER TECHNOLOGY

The advantage of a laser cut vent (Figure 2) is the sealing and fabric reinforcement that occurs around the outside edge versus a cut that is done by a simple knife. As the laser cuts the fabric, the edge of the material is heated and fused together. This structural advantage allows the use of laser cut vents from 0.25” in diameter to over 1” in diameter.

ENGINEERING

In calculating a vent size, the equation used calls for CFM per linear foot basis* (Figure 3). The dated technology of mesh vents falters because of its CFM per linear foot limitations. The smallest increment with a mesh vent is 6–11 CFM per linear foot, depending on manufacturer (based on a 0.5” w.g.). This is caused by the lack of options in the mesh width size, which is in 0.125” size increments. Since the mesh is sewn in the entire length, in which there are typically vents on both sides, the difference can be substantial.

* This is sometimes abbreviated to just a CFM designated vent. A vent that diffuses 10 CFM of air per linear foot at 0.5” static pressure could just be called a 10 CFM vent.

Figure 3

Airflow	3200	cfm
Diameter	22	inch
Length	62	feet
Inlet Velocity	1213	in of H_2O
Inlet Static Pressure	0.40	in of H_2O
Velocity Pressure	0.09	in of H_2O
Frictional Losses	0.02	in of H_2O
Average Pressure	0.45	in of H_2O
Maximum Pressure	0.47	in of H_2O
Fabric Porosity	0.00	cfm/ft^2
Fabric CFM	0	cfm
	Vent Set #1	
% of Air to Disperse	100%	
Number of Vents	2	Vents
Total Vent CFM	3200	cfm
Standard L-Vent Size	27	cfm/ft
Optional M-Vent Size	0.31	inches

The calculations in Figure 3 are based on a typical eight ton AHU. In this scenario, the calculations call for a 27 CFM vent. In using laser hole cutting technology, the calculated vent size can easily be met. If this same scenario was designed with mesh vents, the factory engineer would specify a 0.25" vent, which delivers 22 CFM per linear foot, or a .375" vent, which delivers 33 CFM per linear foot. The first scenario would cause the system to have an undesirable 67% increase in static pressure to push the air out of the smaller vent. The AHU may not be able to handle this, the needed airflow requirement may not be met, and the airflow throw may be increased into an excessive and undesirable range. The second scenario would cause the pressure in the system to drop by 33% due to oversizing, leaving the fabric duct looking deflated. It also may not meet airflow and throw needs.

STRENGTH

Tensile testing and tear strength testing have shown that some mesh vents can have higher strength values compared to fabric. But, as in most cases, the total strength of a system usually comes down to the strength of the weakest link. In the case of a mesh vent, the tear strength may be stronger than the fabric itself, but the total strength of the system is really no stronger than the fabric. In the case of a laser vent, the tear strength is just as strong as the fabric. In any event, there are two industry standards that can be specified to be sure that the product meets a certain level of quality assurance. International Code Council Evaluation Service Acceptance Criteria for Fabric Air Dispersion Systems (ICC-ES AC 167) and Underwriter's Laboratory UL 2518 are the only two such industry standards that include strength evaluations specifically for fabric air dispersion systems. In these standards, there are multiple strength/durability evaluations. Laser vents have performed favorably in these evaluations.

CLOGGING

A problem that has plagued airflow systems, metal or fabric, is debris in the system. Many times the small mesh screen size acts as a filter catching particulate. The typical mesh opening is 0.05" by 0.05", which does enough filtration to cause problems, as seen in the middle photo below. The smallest diameter laser vent is 0.25." Openings of this size do not act as filters—they allow most particulate to flow through the system.

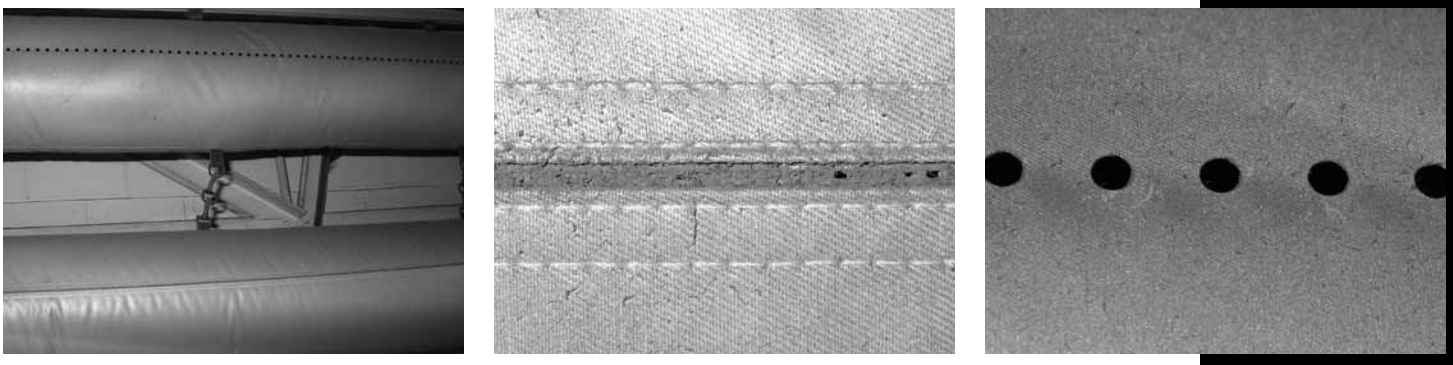


Figure 4. Photo on left: Side by side comparison—laser on top, mesh on bottom. Photo in middle: Mesh vents after several months of use. Photo on right: Laser vents after several months of use.

SOUND

The more edge area (or opening circumference) air touches while it is being distributed, generally, the more noise it creates. This cannot be more true when it comes to mesh vents. The screen-like qualities of the mesh venting system creates noise.

The size opening of the laser vents again have an advantage. There is much less opening edge being touched by air in a laser vent as compared to a mesh vent system (see Figure 5).

Figure 5

Mesh Vents

Laser Vents

The below calculations are based on a fabric ducting noise calculation program developed by JGL Acoustics of Issaquah, WA. Note: The following sound data is a calculation of air dispersing out of an entire system within the space. This is not typical with a normal diffuser. A register NC rating will give the level of a single diffuser, so it is not comparable. We point this out in an effort to alleviate confusion that our product is not quiet enough.

Figures 6 and 7 offer a comparative analysis of the NC and dBA levels with laser vents and mesh vents. The NC level of the mesh venting is 5 NC higher than the laser, while the 5.6 dBA level is also higher than the laser venting.

Figure 6: Mesh Vents

Job Name	Multi Purpose Room
Room Name	Community Center
Room Length (feet)	80
Room Width (feet)	50
Room Height (feet)	15
Acoustical Treatment Type	1
Duct Diameter (inches)	22
Total Active Diffuser Length (feet)	62
Distance to Active Diffuser (feet)	14
NC Goal	30
Duct Static Pressure (inches of water)	0.40
Product Type	XM-M375

Finalize Calculation

Actual NC Rating: **NC-37**
Predicted Total Sound Level: **39.4 dBA**

Acoustical Treatment Types
1: None (e.g., swimming pool or untreated gym)
2: Slight (acoustical ceiling only or fully carpeted floor only)
3: Moderate (acoustical ceiling with carpet and furniture)
4: Significant (acoustical ceiling, carpet, and acoustical wall panels)

Figure 7: Laser Vents

Job Name	Multi Purpose Room
Room Name	Community Center
Room Length (feet)	80
Room Width (feet)	50
Room Height (feet)	15
Acoustical Treatment Type	1
Duct Diameter (inches)	22
Total Active Diffuser Length (feet)	62
Distance to Active Diffuser (feet)	14
NC Goal	30
Duct Static Pressure (inches of water)	0.40
Product Type	XML30

Finalize Calculation

Actual NC Rating: **NC-32**
Predicted Total Sound Level: **33.8 dBA**

Acoustical Treatment Types
1: None (e.g., swimming pool or untreated gym)
2: Slight (acoustical ceiling only or fully carpeted floor only)
3: Moderate (acoustical ceiling with carpet and furniture)
4: Significant (acoustical ceiling, carpet, and acoustical wall panels)

CONCLUSION

The linear vents of typical fabric air dispersion systems are ideal for many environments where the supply air is discharged very close to, or in, the occupied zone. But, there are significant differences between how the linear vent styles can be accomplished. The following steps need to be taken when using mesh vents.

- Mesh vents need to be washed/cleaned more often.
- Fans may need to be balanced or replaced to handle additional static pressure.
- Variables may need to be changed to deal with additional noise.

All-in-all, if there is a point in the specification process where a particular linear vent style can be chosen, then the choice is clear. Laser venting technology is cleaner, quieter, and more accurate making it the superior choice in fabric air distribution.

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