

CARNES®

Tech Talk

AWARE

a●ware'

Adj.

apprised;
informed;
cognizant;
conscious

THIS ISSUE: **Performance Issues in Ducting**
 Eggcrate Return Grilles

By Jon Paulos, Product Line Manager for D, R & G

April 2001
Volume #1

When engineers design ducted ceiling returns, the eggcrate grille is frequently specified because its high degree of free area (over 90%) provides very low pressure drop, thus allowing a smaller fan size and fewer returns in a space.

The most common style of commercial ceiling is the suspended ceiling, usually referred to as “T-bar”. When laying out the air distribution plan for rooms with T-bar ceilings, specifiers usually assume the use of full-face lay-in sizes of eggcrate. So if the ceiling grid is laid out on 2-foot square centers, the design is laid out assuming a 2-foot square eggcrate return grille.

With a grille of that size, the pressure drop is quite low and it works well. The engineer specifies a grille model and a duct size (usually round), then goes on to the rest of the building.

This causes two problems.

First, the engineer frequently does not consider the effect of the duct connection, and so does not include the pressure drop of the transition. Indeed, information on the pressure drop through the transition is not readily available in most duct design programs. This causes inaccuracy in the system design, requiring the engineer to build in a larger margin of error than he should need to.

Second, when the contractor gets bids on the projects from the suppliers, they are not sure what is specified (only the duct size was specified), and therefore they are not sure what to bid.

Should they bid and supply a full-face eggcrate grille, with a transition down to the appropriate neck size? This is what is intended (but not specified) by the engineer, but the transition is expensive and there is considerable price pressure to supply the lowest cost option. Plus the unit may not perform as intended because the engineer may not have included the transition pressure drop.

Should they supply a smaller eggcrate grille with a smaller transition (therefore much less expensive), and then set it in a T-bar panel? This is frequently the less expensive option, but will not perform as the design calls for. The engineer didn't specify clearly enough to exclude this, so it become a possibility.

The Carnes ducted eggcrate return grille is designed to solve this problem. It provides the engineer with full-face eggcrate, and the cataloged performance data includes the transition, so it is possible to design a system with greater confidence in the design's accuracy.

Refer to the tables following for a comparison of the different approaches and how they affect the performance.

Figure One shows comparison of sound levels for two possibilities.

Suppose the engineer calls for an 8" x 8" square duct, but leaves the rest of the size spec unspecified.

If an 8" x 8" eggcrate return is supplied and installed, the sound level will be as shown. At 400 cfm, for example, the sound level will be NC34.

If the Carnes RUPBE is supplied, the sound level will be as shown. At 400 cfm for example, the sound level will be NC19 and RC20N. (See Carnes Tech Talk "RC Sound Data", published June 1998.)

If a full-face (22" x 22") eggcrate grille is supplied, the published sound level is extremely low, but does not take into account the effect of the transition. So it is difficult to say exactly how it performs.

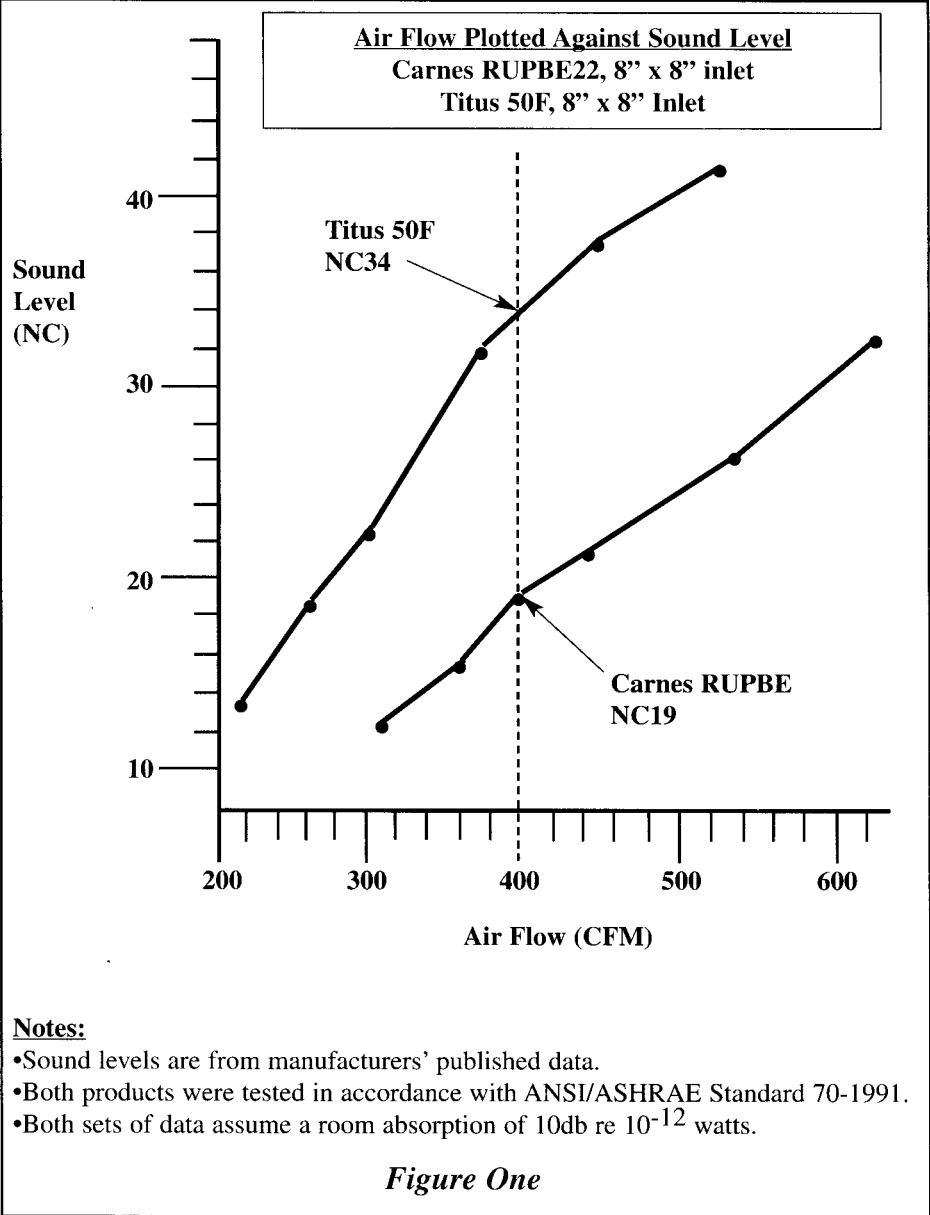


Figure Two shows a comparison of negative static pressure levels for two possibilities.

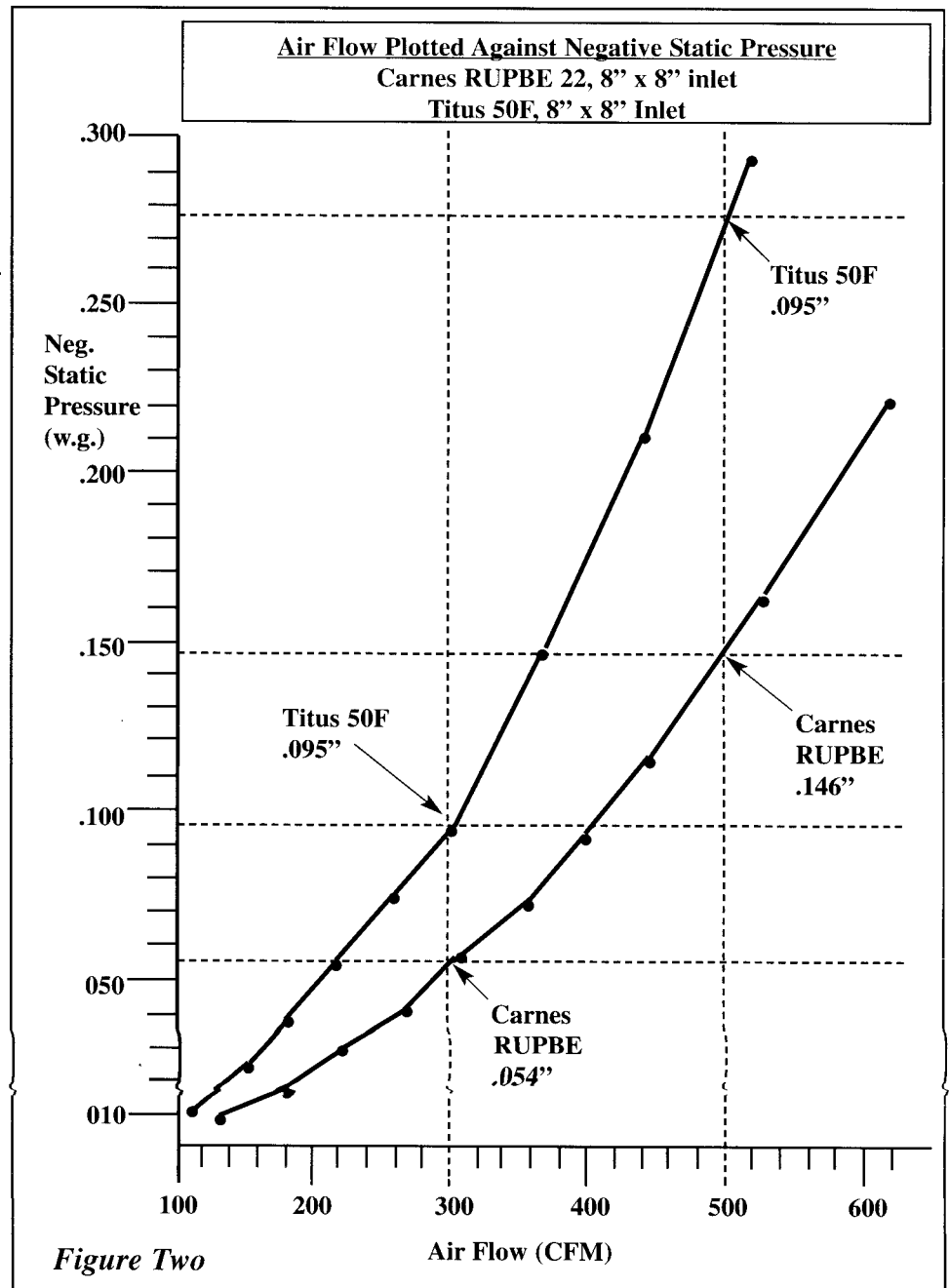
Suppose the engineer calls for a 8" x 8" square duct, but leaves the rest of the size spec unspecified.

In an 8" x 8" eggcrate return is supplied and installed, the negative static pressure will be as shown. At 300 cfm, for example, the pressure drop will be .095", a pressure drop that could cause fan problems on a job with large quantities of eggcrate returns.

If the Carnes RUPBE is supplied, the pressure drop will be as shown. At 300 cfm for example, the level will be .054".

At 500 cfm, the small grille approach will yield a pressure drop of .276", while the Carnes RUPBE will have a drop of .146".

Again, if a full-face (22" x 22") eggcrate grille is supplied, the published pressure drop is extremely low, but does not take into account the effect of the transition. So it is difficult to say exactly how it performs.



Summary

Because of vague spec in the drawings and schedule, and because of the limited information available to specifiers, problems can arise in the performance of the system. It is important to be clear in the spec, and the Carnes ducted eggcrate return can aid the engineer in designing the system as well as clarifying the specification.

Note these other new products from Carnes.
Practical Solutions for Real Life Design Problems.

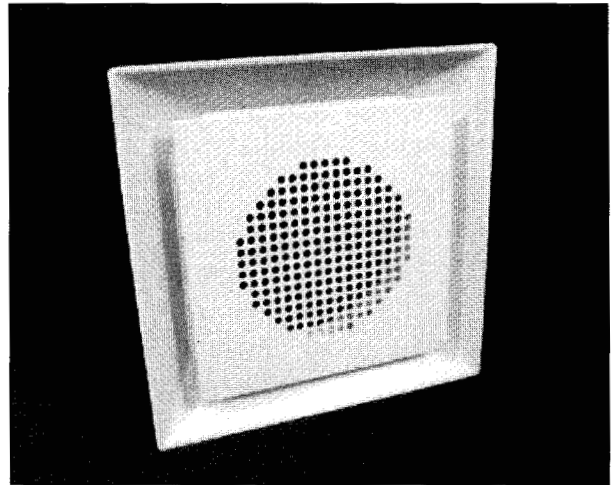
Model SFHA

Plaque Diffuser with Perforated Face.

This is an architecturally pleasing diffuser with very low sound levels, suitable for high ceiling spaces. 50% of the air flow is delivered horizontally, and 50% vertically. It is well suited for spaces where seasonal horizontal-vertical adjustment is not possible or practical.

Good applications are church sanctuaries, school auditoriums and movie theaters.

Request Catalog D-21 from your local Carnes representative.



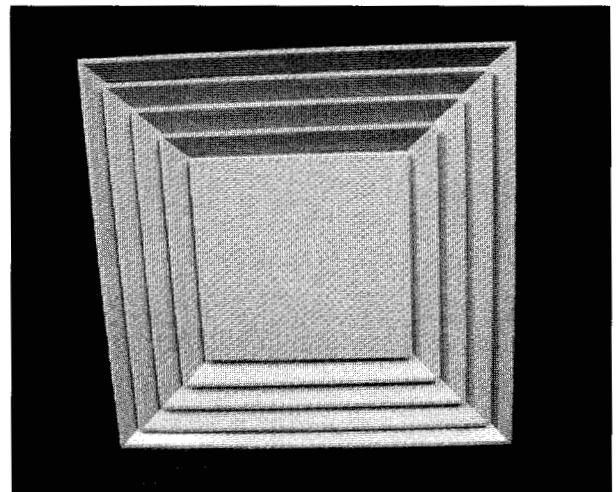
Model SKPB.

Square Louvered/Plaque Face Diffuser.

This offers a different look for the traditional 24" x 24" T-bar lay in diffuser. When the customer wants something different, reach for this. It is available in a range of neck sizes, and the specifier has a choice of 1-4 slots. It is well suited for VAV applications, and resists dumping to very low air flows.

Good applications are any spaces with T-bar ceilings.

Request "Supplement to Catalog D-70" from your local Carnes representative.



Model SPMB.

Modular Core Perforated Face.

This is used in commercial spaces where the room dimensions change and require a change in the air distribution plan. The cores are field adjustable to all blow patterns without requiring the use of tools. The perforated face masks the louvers from view.

Good applications are shopping malls, office buildings and any building with modular walls.

Request Catalog D-39 from your local Carnes representative.

