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Finding Performance Data for Unlisted Size Registers by Using Listed Sizes (Interpolation or Extrapolation)

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I know what you are thinking: "Oh no, here comes another math lesson. I don't even know what those big words mean!" Well, you're right. This is going to involve math to some degree, but only simple addition and multiplication. It's more about teaching you the concept of sizing a register or grille for a size not shown in our performance data tables, based on data for a size that is shown (to interpolate or extrapolate).

Interpolate means working within the maximum and minimum table entries to find data for a size that falls between two listed sizes. ***Extrapolate*** means to project known data from a listed size for a size that falls beyond the largest size listed.

Previously in *Tech Talk* TT-19, I mentioned the alternate sizing graph in the back of our catalog as one means of finding performance data for the 821/92/HV series products for sizes that are not listed based on sizes that are. I also mentioned using a calculator to find a listed size register that has similar gross square inches as the unlisted size. By using the data for the register that is close in equivalent area, you will have a good idea of its performance. This is sometimes called "the equal area method." This is an *iterative* process in that it requires a "trial-and-error" approach until a solution is found.

We will again use the 821/92/HV series products as examples, although this same discussion can be applied to many other products as well. These products lend themselves to the discussion because of the numerous sizes that are listed, with which I will demonstrate both interpolation and extrapolation.

Let me begin by saying that any alternate sizing must remain not only within the same deflection (A, C, E, or

(continued on reverse side)

G) table, but also under the same column of face velocity. My examples will all be from the Deflection A performance data and in the 400 Feet-per-Minute face velocity column for simplicity. The principles apply to any deflection and face velocity, however.

A 24 x 12 register will be twice as large as a 24 x 6 register. A 24 x 24 is two times larger than a 24 x 12 and four times larger than the 24 x 6. But a 12 x 6 is ¼ the size of a 24 x 12. See the representation below.

24

12 x 6	12 x 6
12 x 6	12 x 6

12

If a register is twice as large, it will allow twice as much air to pass through at the same face velocity. I use these sizes since one can look them up in our catalog to follow along. Going from 24 x 6 to 24 x 12 will demonstrate a doubling of both the size and the CFM (310 to 635). Likewise, doubling a 10 x 6 to a 20 x 6 will double the CFM from 125 to 255 (with rounding). This is *interpolation* within the table entries. If we wanted to *extrapolate* from the 20 x 6 to a 40 x 6, the CFM would double again from what it is for the 20 x 6 (255) to about 510 CFM for the 40 x 6. You can check this by using the alternate sizing chart in the back of our catalog to discover that a 40 x 6 has equivalent performance (and area) as a 24 x 10 or 30 x 8, both of which are listed in the table. The 40 x 6 has 240 square inches of gross area and shares this number with both the 24 x 10 and 30 x 8 (equal area method).

Examples: An 18 x 12 is not a size that is listed, but a 36 x 12 is. If we take half the CFM of a 36 x 12, it will represent the CFM for the 18 x 12 at the same face velocity. CFM for an unlisted 36 x 24 will be twice that of the listed 36 x 12 and for an unlisted 36 x 36, three times that of the 36 x 12.

Be sure to keep in mind what constitutes *twice* the size as opposed to *four* times the size of a register. Doubling one dimension only will double the size while doubling both dimensions will quadruple (4x) the size.

One last comment: To determine a rough throw result, use the multiplication factors below.

If you:

- Double the size and CFM, multiply the throw by 1.5
- Quadruple the size and CFM, multiply the throw by 2
- Half the size and CFM, multiply the throw by .67
- One quarter the size and CFM, multiply the throw by .5

By now, most of you are probably thinking, "I'll never remember how to do this. It's a lot easier to just call Hart & Cooley and ask for help." We remain here to do just that, but file this *Tech Talk* for reference.

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