TT-24

March 2006

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What are the Considerations in Sizing a Return?

by Dave Fetters

In a previous *Tech Talk*, we discussed return grille ***locations*** (TT-09). This time we will look at ***sizing*** return grilles.

As we have stated before, return air volume to the air handler (fan) must equal what is supplied from the air handler, otherwise system performance will suffer. Not all the air that is returned may be from the occupied spaces. Some make-up air may be brought in from the outside. No matter the mix of indoor to outdoor return air, the fan needs to see the same volume coming in as it sends out. If the system requires 80% of the supply air volume to be returned through grilles, the amount of airflow through each depends on the number of each. A 2000 CFM system returning 80% will require a single filter grille to handle 1600 CFM, four return grilles to handle 400 CFM each, or some other combination.

The return air grilles or return air filter grilles should be unobtrusive during fan operation. This means paying attention to the face velocity when sizing these grilles so that humming or whistling noises do not occur. These noises are symptoms of face velocities that are too high. In filter grilles, this may also indicate that the velocity is higher than the rating of the filters.

General recommendations for residential return grille maximum face velocities are about 600 Feet-per-Minute (FPM) for grilles and 400 FPM for filter grilles. These products usually have stamped louver faces (Model 650).

650 Return Air Grille

(continued on reverse side)

Special consideration must be given to master bedroom suites and home theater rooms where lower velocities may have to be considered to guarantee no noise. Assembled grilles using heavier steel or extruded aluminum will not share the humming noise with their stamped-face cousins, but can make airflow noises if the velocity creeps up (Model RH45). The room activity and background noise level will help dictate how high the face velocity may extend. A noisy cafeteria or busy lobby can afford higher velocities than executive offices or libraries.

RH45 Grille

Once a reasonable face velocity is determined for the type of grille being considered, use the performance data in the back of our catalog or from our web site to size the grille. Under "Face Velocity" for the style grille being considered, go down that column until the CFM figure equals or slightly exceeds the volume flow rate necessary. Without benefit of the catalog, a rule of thumb is to plan for 2 CFM for each square inch of gross grille area. This rule will keep you within a safe face velocity.

A 20x20 grille has 400 square inches of gross area. If the "2 CFM/square inch" rule is used, 800 CFM is what the grille will handle with a low enough face velocity to avoid noise. For our 650 grille, using this method results in a face velocity of about 430 FPM. This rule is a little conservative for grilles, but much closer for filter grille performance.

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