

MECHANICAL CODE DISCUSSION

Return Air Paths Revisited

BACK IN JUNE of 2009, I wrote about the return air path from supply air outlets, back to the return air inlets. This remains a hot subject in my daily conversations and communications with contractors and code officials across the state.

Due to the continued interest in the subject, a second round is in order.

The 2009 IRC, section M1601.1 reads: Duct systems serving heating, cooling and ventilation equipment shall be fabricated in accordance with the provisions of this section and ACCA Manual D or other approved methods. The 2009 IMC contains similar text for single dwelling units. When I receive a call asking for the code section requiring a return path from every bedroom, I share these sections out of the IRC and IMC. The code requires residential duct systems to be designed per Manual D, making Manual D a part of the code by reference.

ACCA Manual D section 4-9 states: An engineered, low resistance return path shall be provided from every room or space that receives supply air. By definition, a low resistance path requires the velocity through an opening no greater than 350 fpm. Notice the 350 fpm velocity of the air under a door or through a set of transfer grills is one half the recommended 700 fpm velocity for a residential duct. The opening must

Door Cut Height for 300 Fpm Air Velocity							
Cfm Under Door	Door Width (Inches)						
	24	30	36	42	48	54	60
	Clearance (Inches) to Floor or Top of Carpet						
100	2.0	1.6	1.3	1.1	1.0	0.9	0.8
200	4.0	3.2	2.7	2.3	2.0	1.8	1.6
300	6.0	4.8	4.0	3.4	3.0	2.7	2.4
400	8.0	6.4	5.3	4.6	4.0	3.6	3.2
500	10.0	8.0	6.7	5.7	5.0	4.4	4.0
600	12.0	9.6	8.0	6.9	6.0	5.3	4.8
700	14.0	11.2	9.3	8.0	7.0	6.2	5.6
800	16.0	12.8	10.7	9.1	8.0	7.1	6.4
900	18.0	14.4	12.0	10.3	9.0	8.0	7.2
1,000	20.0	16.0	13.3	11.4	10.0	8.9	8.0
1,200	24.0	19.2	16.0	13.7	12.0	10.7	9.6
1,400	28.0	22.4	18.7	16.0	14.0	12.4	11.2
1,600	32.0	25.6	21.3	18.3	16.0	14.2	12.8

Table A1-2

of the flooring to the bottom of the door. The chart was added to Manual D as many contractors regularly claim the use of the space under the door for the return path. Please observe on Table A1-2 (above left), a master bedroom with 400 CFM of supply air into the room and an attached bath will require a 5.3" high opening under the door to provide a path back to a central return. A quick review of the table shows even 100 CFM requires more than a one inch space under the door. Locating a return in the bedrooms, or providing properly sized transfer grills is often the best solution.



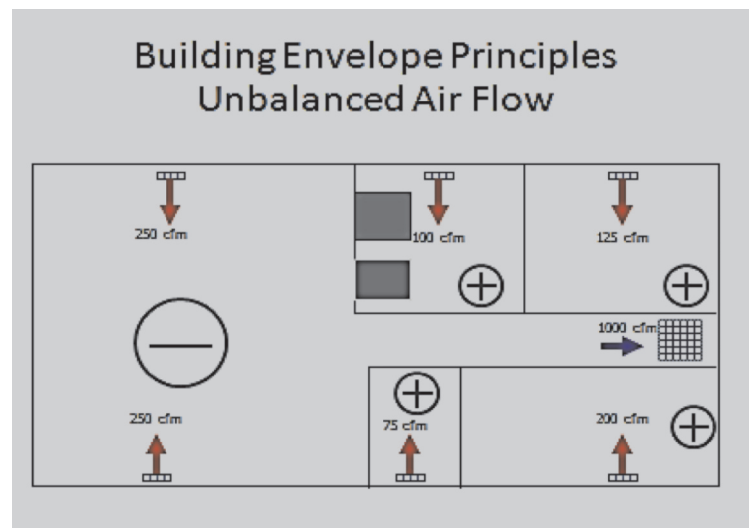
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be at least twice as large as the branch duct serving the supply air outlet. The 2009 edition of Manual D includes a Door Cut chart, showing the clearance required

Let's consider the example of the home in the graph (below right); where there is not a low resistance path back to the central return air inlet. The home is a place in a condition where the living space is under a negative pressure and the bedrooms are under a positive pressure. This creates an increased leakage of air to outside from the positive pressured bedrooms; and conversely, an increased leakage (or infiltration) of air from outside into the negative pressured living space. The return path for at least a portion of the total return air is through the environment outside of the home.



Graph 1

Failure to provide the required low resistance path not only impacts comfort, it increases energy consumption. ■

Thanks again for your questions and comments. —Brent