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Transfer Grille Sizing

Research Report - 0005

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Abstract:

Sizing information excerpted from "BA-0006: Discussion of the Use of Transfer Grilles to Facilitate Air Flow in Central Return Systems."

Transfer Grille Sizing Table

- Goal is to prevent pressurization of individual bedrooms when door is closed
- Maximum pressurization of 3 Pa (0.012 WIC) is specified
- Transfer grille size is based on supply flow to room
- At master bedroom suite (or any other multi-room suite), supply flows must be totalled, and transfer grille sized based on that total

Given:

Door width:	32 inch
Door undercut:	0.5 inch
Transfer grille width:	10, 12, or 14 inches
Net free area:	0.75 fraction of total grille area

Find: How high does the return air transfer grille have to be to meet the 3 Pa criteria?

Room supply air flow (CFM)	Net free area required (in^2)	Area required after door undercut (in^2)	Transfer grille height required for listed width in inches			Jump Duct Diameter Required (in)
			10 (in)	12 (in)	14 (in)	
50	27.0	11.0	1.5	1.2	1.0	3.7
75	40.5	24.5	3.3	2.7	2.3	5.6
100	54.0	38.0	5.1	4.2	3.6	7.0
125	67.4	51.4	6.9	5.7	4.9	8.1
150	80.9	64.9	8.7	7.2	6.2	9.1
175	94.4	78.4	10.5	8.7	7.5	10.0
200	107.9	91.9	12.3	10.2	8.8	10.8
225	121.4	105.4	14.1	11.7	10.0	11.6
250	134.9	118.9	15.9	13.2	11.3	12.3
275	148.4	132.4	17.7	14.7	12.6	13.0
300	161.9	145.9	19.4	16.2	13.9	13.6
325	175.4	159.4	21.2	17.7	15.2	14.2
350	188.9	172.9	23.0	19.2	16.5	14.8

Based on $Q = 1.07 \times A \times \Delta P^{0.5}$ for square edged orifice flow

where: Q = room supply flow (CFM)
1.07 = constant, including unit conversions
A = free area (in^2)
ΔP = pressure difference between room and central area (Pa)

Typical Free Area Measurements of Return Air Grilles

- Ameri-Flow Return Air Grilles
- Data from Grainger Catalog (2001)

Nominal		Overall size		Free Area
Width	Height	Width	Height	(in^2)
10	6	11.5	7.5	51
12	6	13.5	7.5	61
12	12	13.5	13.5	121
14	6	15.5	7.5	71
14	14	15.5	15.5	163
20	20	21.5	21.5	336
30	6	31.5	7.5	153

About the Author

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