

TECH TIP # 12



One of a series of dealer contractor technical advisories prepared by HARDI wholesalers as a customer service.

SELECTING THROUGH-THE-DOOR RETURN AIR GRILLES

In the design of return air systems, it's often useful to use a common corridor as a return "plenum." In that event, rooms adjacent to the corridor need **not** be fitted with individual room returns --- **provided** that each door is undercut or a door grille is installed. Either technique provides an unobstructed path for room air to escape into the corridor and ultimately into the return duct system even with all doors closed.

Door grilles come in a variety of louver configurations to provide varying degrees of sound and visual isolation. For a given pressure differential across the door, the air handling capacity of any door grille depends upon the **free** or clear area of the grille and the louver configuration.

The grille free area might be 30, 40 or 50 percent of the core area --- roughly the length times the width of the opening made in the door. And obviously, a door louver intended to be **light**-proof will handle less air for a given pressure drop than say an ordinary chevron **sight**-proof style because of the more tortuous route the air must take to pass through the no-light grille.

In ordinary work using conventional door grille designs, precise pressure drop analysis is considered unnecessary since most grilles made today will impose less than 0.1 in. WG resistance when using the currently accepted selection procedure of limiting face velocities to less than 300 fpm.

Note that 300 fpm is **less** than the values recommended for ordinary return intakes. This is intended to account for the fact that, in general, door grille resistance is **higher** than regular return grilles or lattice inlets. It's quite common, in fact, to size grilles based on a 150 fpm face velocity - - especially when exhaust requirements are 100 cfm or less per room.

As an example: If 100 cfm must be returned from a room, a grille with 100/150 or 0.67 square feet (129 sq. in.) would be installed in the door based on the 150 fpm face velocity selection criterion. Typically, for a chevron no-vision style grille, this would mean something on the order of a 20 x 12 inch grille.

(continued)

Published by the Independent Study Institute, a division of the Heating, Airconditioning & Refrigeration Distributors International. The Institute offers accredited, industry training courses in HVAC/R technology. Direct inquiries to HARDI 3455 Mill Run Drive, Ste. 820, Columbus, OH 43026. Phone 888/253-2128 (toll free) · 614/345-4328 · Fax 614/345-9161

www.hardinet.org

Table 1 can be used to determine the required grille free area to handle a given cfm for **ordinary** door grilles over the useful range of recommended face velocities. Sizes (in parentheses) indicate the generally preferred sizes.

Do **NOT** use Table 1 for specialized applications involving precise room-to-corridor pressurization, say for a laboratory. Pressure loss curves for specific door grilles supplied by the manufacturer should be utilized to evaluate room/grille characteristics in such instances.

Table 1				
Air returned from	Required grille free area, sq. in. Door grille face velocity			
Space (cfm)	(150 fpm)	200 fpm	250 fpm	300 fpm
50	(48)	36	29	24
75	(72)	54	43	36
100	(96)	72	58	48
125	(120)	90	72	60
150	(144)	108	86	72
175	(168)	126	101	84
200	(192)	144	115	96
225	(216)	162	130	108
250	(240)	180	144	120
275	(264)	198	158	132
300	(288)	216	173	144