

TECH TALK

TT-09

October 2004



Return Grille Locations

by Dave Fetters

Return grilles or filter grilles are just as important to the HVAC system as the supply side products. Return air volume to the air handler must equal the supply air volume pumped out by the fan, or system performance will suffer. Air will not readily flow into a room from a register unless there is a relief opening for the “stale” air to flow out. This could be as simple as having the door open to a small room for air to drift out to an adjacent room that has a return grille.

Door grilles, or “transfer grilles” as they are sometimes called, allow room air to flow out of the room if the door is closed most of the time,

and otherwise doesn't have its own return grille. Bathrooms and janitor's closets in some commercial buildings are examples.

A common misunderstanding is that return grilles have a dramatic effect on room air distribution. In fact the opposite is true based on laboratory research. Return airflow has a negligible effect on room air patterns because of its low-capture velocity. This means that the sphere of influence, or the area affected by the return grille, is limited to a little over one duct diameter away from the face. Within this short distance, the air is captured and pulled into the grille. Outside this immediate area, the capture velocity is so low

as to be ineffective in influencing room air motion. Since the airflow approaches the grille from all directions, its velocity decreases rapidly as the distance from the opening increases. In other words, a return grille will not “reach out into the room” and pull the room air toward itself.

There is a preferred location for returns and that is in an area called the “stagnant zone.” This is an area in the room that is outside the influence of the supply register where room air motion is inactive except for natural convection. When heating is the primary requirement, the stagnant area will be close to the floor where the coolest air will gather. Thus, the coldest air will be delivered back to the heating appliance.

If cooling is the priority, the stagnant area will be the warm air that gathers near the ceiling that should be removed first and returned to the cooling coils.

For a combination heating and cooling system, the preferred location for the returns will meet the requirements of one of the seasons, but will only be a compromise for the other. The designer needs to

weigh whether heating or cooling is more important and place returns accordingly. Even though for the remaining season the returns are not ideally placed, the performance will be more than adequate.

Return air face velocity depends somewhat on the environment and grille design. Stamped, louver-faced residential returns like our 650 or 672 should be limited to about 600 feet per minute (FPM) as a rule of thumb. Commercial “assembled” returns can stand velocities up to 1000 FPM if the room background noise allows. Filter returns that use throw-away fiberglass disposable filters should limit the face velocity to 400 FPM. The maximum rating for these types of filters is usually 500 FPM, beyond which their ability to remove dirt from the air stream diminishes rapidly.



Hart & Cooley
install confidence

Hart & Cooley, Inc.
500 East Eighth Street
Holland, MI 49423
info@hartcool.com
www.hartandcooley.com

800.433.6341 *toll-free*
616.392.7855 *phone*
800.223.8461 *toll-free, fax*
616.392.7971 *fax*