

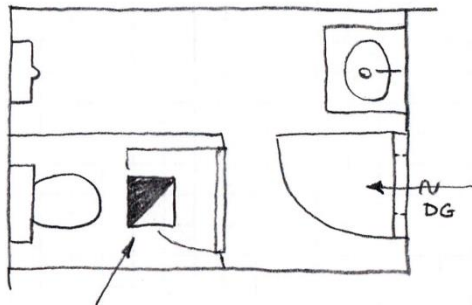
# Return & Exhaust Flowrates & Grille Placement

**Return and Exhaust Grille placement** is a bit of an art so it is worth laying out a few guidelines:

- Usually Return Air Grilles are placed in the ceiling or floor of a space.
- Often a ceiling tile is replaced by a Grille. This allows the room's return air to flow directly into the ceiling space where it is removed by the return air duct system.
- Place the Return Air Grilles:
  - a. Away from Supply Air Diffusers as much as possible.
  - b. Where they might extract some evil fumes (smoke, foot odor, bathroom smells, food odors, etc.)
  - c. Don't go to nutty trying to work out the perfect Return Air Grille location. Exhaust and Return Grilles have a very limited effective radius of direct extraction. See the diagram below. Mostly what you are trying to do with good Return Grille placement is create a general air flow direction within the space that will make the occupants feel more comfortable.

Here are some illustrations that might help clarify.

## BATHROOM

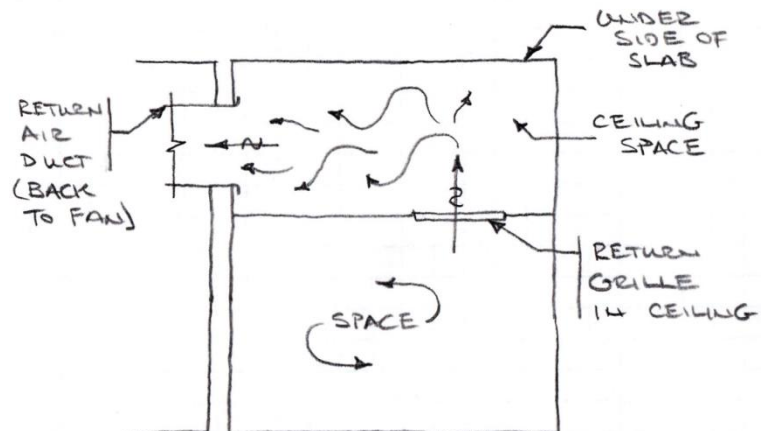


EXHAUST SIZED TO ASHRAE 62 OR TO PROVIDE AT LEAST 3 ACH. NOTE LOCATION - AT THE SOURCE OF THE PROBLEM!

DOOR GRILLE LETS AIR IN TO MAKE FOR EXHAUST REMOVED

FAN LOCATION: AT EXIT OF DUCT TO OUTSIDE, THE ROOF IS A GOOD PLACE.

## OCCUPIED SPACES



Finally, ASHRAE 62.1 recommends certain exhaust air flowrates. See the table below. Exhaust air is air that is removed from the space and delivered directly to the outdoors. None of the exhaust is recirculated like the return air. In working out the air flowrates into a space you will have to make sure that the calculated outdoor air flowrate is greater than the determined flowrate of exhaust air.

**TABLE 6-4 Minimum Exhaust Rates**

| Occupancy Category                      | Exhaust Rate,<br>cfm/unit | Exhaust Rate,<br>cfm/ft <sup>2</sup> | Notes | Exhaust Rate,<br>L/s-unit | Exhaust Rate,<br>L/s·m <sup>2</sup> | Air<br>Class |
|---|---------------------------|--------------------------------------|-------|---------------------------|-------------------------------------|--------------|
| Arenas                                  | –                         | 0.50                                 | B     | –                         | –                                   | 1            |
| Art classrooms                          | –                         | 0.70                                 |       | –                         | 3.5                                 | 2            |
| Auto repair rooms                       | –                         | 1.50                                 | A     | –                         | 7.5                                 | 2            |
| Barber shops                            | –                         | 0.50                                 |       | –                         | 2.5                                 | 2            |
| Beauty and nail salons                  | –                         | 0.60                                 |       | –                         | 3.0                                 | 2            |
| Cells with toilet                       | –                         | 1.00                                 |       | –                         | 5.0                                 | 2            |
| Copy, printing rooms                    | –                         | 0.50                                 |       | –                         | 2.5                                 | 2            |
| Darkrooms                               | –                         | 1.00                                 |       | –                         | 5.0                                 | 2            |
| Educational science laboratories        | –                         | 1.00                                 |       | –                         | 5.0                                 | 2            |
| Janitor closets, trash rooms, recycling | –                         | 1.00                                 |       | –                         | 5.0                                 | 3            |
| Kitchenettes                            | –                         | 0.30                                 |       | –                         | 1.5                                 | 2            |
| Kitchens—commercial                     | –                         | 0.70                                 |       | –                         | 3.5                                 | 2            |
| Locker/dressing rooms                   | –                         | 0.25                                 |       | –                         | 1.25                                | 2            |
| Locker rooms                            | –                         | 0.50                                 |       | –                         | 2.5                                 | 2            |
| Paint spray booths                      | –                         | –                                    | F     | –                         | –                                   | 4            |
| Parking garages                         | –                         | 0.75                                 | C     | –                         | 3.7                                 | 2            |
| Pet shops (animal areas)                | –                         | 0.90                                 |       | –                         | 4.5                                 | 2            |
| Refrigerating machinery rooms           | –                         | –                                    | F     | –                         | –                                   | 3            |
| Residential kitchens                    | 50/100                    | –                                    | G     | 25/50                     | –                                   | 2            |
| Soiled laundry storage rooms            | –                         | 1.00                                 | F     | –                         | 5.0                                 | 3            |
| Storage rooms, chemical                 | –                         | 1.50                                 | F     | –                         | 7.5                                 | 4            |
| Toilets—private                         | 25/50                     | –                                    | E     | 12.5/25                   | –                                   | 2            |
| Toilets—public                          | 50/70                     | –                                    | D     | 25/35                     | –                                   | 2            |
| Woodwork shop/classrooms                | –                         | 0.50                                 |       | –                         | 2.5                                 | 2            |

A Stands where engines are run shall have exhaust systems that directly connect to the engine exhaust and prevent escape of fumes.

B When combustion equipment is intended to be used on the playing surface additional dilution ventilation and/or source control shall be provided.

C Exhaust not required if two or more sides comprise walls that are at least 50% open to the outside.

D Rate is per water closet and/or urinal. Provide the higher rate where periods of heavy use are expected to occur, e.g., toilets in theatres, schools, and sports facilities. The lower rate may be used otherwise.

E Rate is for a toilet room intended to be occupied by one person at a time. For continuous system operation during normal hours of use, the lower rate may be used. Otherwise use the higher rate.

F See other applicable standards for exhaust rate.

G For continuous system operation, the lower rate may be used. Otherwise use the higher rate.