## Dilution Ventilation versus Displacement Ventilation

<table>
<thead>
<tr>
<th>Dilution Ventilation</th>
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<td><img src="image" alt="Dilution Ventilation Diagram" /></td>
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- Mixing is enhanced (typically assume well-mixed conditions)
- Typical in USA in all construction (office, home, and industry)
- Used for both heating and cooling
Displacement Ventilation

- Mixing is suppressed (air is not well-mixed)
- More common in European countries
- Works best with cooling; less effective for heating
Definition of Displacement Ventilation

- Definition: “Buoyancy-assisted forced ventilation.”
- Cool, fresh air introduced near the floor; warm, contaminated air removed from the ceiling.
- The displacement effect acts like a “piston” pushing the air upward.
- Assumes *stratified* (horizontal) layers of air in the room (warm air near ceiling, cool air near floor).
- Relies on *natural convection* (due to buoyancy) from people and/or objects to remove contaminated air *locally where needed*.

(For a good general reference, see H. Skistad, *Displacement Ventilation*, 1994, Research Studies Press, Ltd.)
Usefulness of Displacement Ventilation

- Useful only for *cooling* rooms, not for *heating* rooms.
- Useful for *removing air contaminants* from concentrated sources (contaminants must be warmer and/or lighter than the surrounding air).
- For the same amount of ventilating air, displacement ventilation provides *better air quality* than does dilution ventilation.
  - Dilution ventilation mixes contaminants throughout the room
  - Displacement ventilation allows contaminants to naturally convect upward *only where required*. 
Example Application of Displacement Ventilation