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From Experience

Maintaining Balance: The Importance of Pressurization and Air Flow

Air may be invisible, but it can noticeably affect the operations of a GMP facility. In particular, improper room pressurization and air flow can create a whole host of issues if not properly addressed, including air infiltration, higher utility bills, airborne cross-contamination and condensation.

Achieving the proper balance between supply air and exhaust air in each building space is key to maintaining pressurization and, in turn, controlling these undesirable conditions. This engineered process begins by creating a hierarchy of relative room pressures, with the cleanest areas assigned higher pressures relative to adjacent rooms having lower hygienic requirements, as illustrated in the table below. Establishing this hierarchy helps prevent unwanted contaminants from entering into clean areas and guides the placement and size of air supply and exhaust throughout the facility.

With a facility-wide room pressurization map in hand, the following steps are recommended to solve issues involving pressurization and air flow:

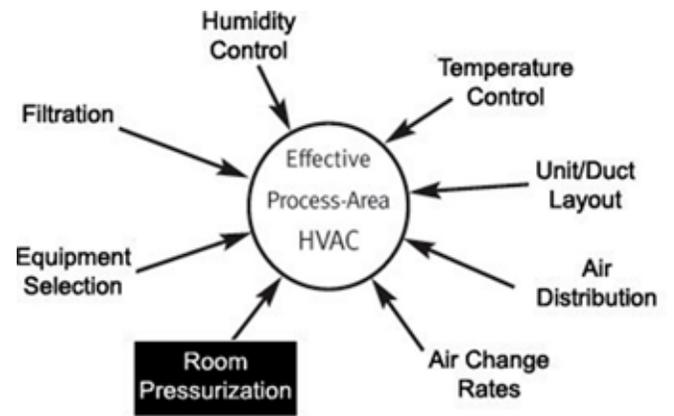
- Identify the sources, direction, volume and velocity of air flowing into the room (e.g., open doors, exhaust fans or airflow through conveyor openings). This data will help identify any new air handling equipment and/or other fixes required to keep rooms at the proper pressurization.
- Assess the impact of adding new air handling equipment or other fixes required to keep rooms at proper pressurization. For example, adding refrigerated make-up air to solve pressurization issues can potentially add to the overall cooling load and create the need for additional compressors, condensers, etc.

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EXAMPLE ROOM PRESSURE HIERARCHY		
Rooms	Relative Air Quality	Relative Pressurization
Starter Culture, Filling	Highest	Highest (++)
HTST, Packaging	High	High (+)
Corridor	Mixed Use	Neutral (N)
CIP	Moderate	Negative (-)
Raw Alcove, Receiving	Lowest	Neutral to Negative (-)

- Keep operating costs in mind. For example, providing a dedicated make-up air source to an exhausted, ambient area would be more economical than supplying that air from an adjacent refrigerated area.

Of course, room pressurization is just one component in the creation of a process-area HVAC system. (See graphic, at right.) Well-designed HVAC systems are those in which each of these elements operate as efficiently and effectively as possible.



EXPERIENCE IN BRIEF

Rules of Thumb

To maintain a room at 40°, as much as 1 ton of refrigeration is required for every 100 cubic feet per minute (CFM) of outside air infiltration on a hot, humid day.



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