The Importance of Clean Air

Food processors today require hygienics and sanitation that are an integral part of their manufacturing process. It's critical to control the environment that surrounds these processes to ensure safety and quality in the finished products. One of the most often overlooked parts of this environment is the air. This includes the temperature, moisture and pressure; air that is in constant contact with the products, equipment, and the employees in the room. The airflow in a controlled production room could have a less than desirable effect on product safety and quality, and the integrity of the controlled room.

Even a small amount of unconditioned outside air such as 1,000 CFM entering a processing room through an open door or unsealed cracks will contain over 2 billion particles. The particles could consist of common dust and dirt, biological particles consisting of yeasts, mold, bacteria and other pathogens; each having an undesirable effect on the products processed in the room. It is very important that the air that is introduced to the room is at the correct dew point. If the air is above the dew point of the room the end result will be the formation of condensation on the ceiling, walls and equipment. This is moisture that fosters growth of yeasts, mold, bacteria, and other pathogens. The USDA, FDA, and other federal and local regulatory entities have a zero tolerance policy for visible condensation and will shut down the processing in any room where condensation is present. This adds a significant cost to the products and must be corrected before processing can continue.

How much air is necessary? Each application is unique, but generally you would need a differential pressure of .05" to .075" of water column between the processing room and any adjacent room or the outside. Any opening in the room will need an outflow velocity of approximately 35 feet per minute. This is essential in building a barrier of pressure that prevents airborne particles from entering the production room. To calculate the amount of outside air necessary to maintain this barrier, measure the area of openings, then multiply that area by 35. The result will be the volume of air needed.

Most often in an existing room, it is not practical to measure all the cracks and crevices, so a rule of thumb is to use between .33 to .50 CFM per square foot of floor area to calculate the volume of outside air needed.

Both of these methods do not account for any existing or proposed exhaust systems used in the room, or if any adjacent rooms are under negative pressure. In these applications, add the volume of these exhaust systems to the volume needed for the area of production outlined in either of the methods outlined above.

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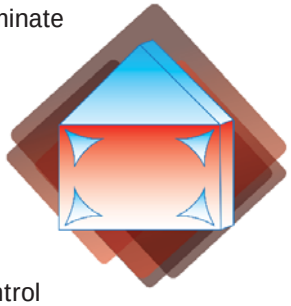
Room Pressurization

Keeping a processing room pressurized with conditioned air will control and eliminate the issues associated with uncontrolled air infiltration. A properly designed system will provide the exact amount of air and condition it to the specifications required in the processing room, controlling the environment. This helps eliminate undesirable particles and helps control the moisture prominent in unconditioned air.



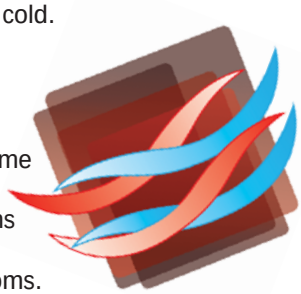
Room Conditioning

Total conditioning of the air to the specifications required in the processing room is equally vital to maintaining the environment. Total conditioning is controlling the temperature, humidity, and filtration of the air in the room. The same system used to introduce conditioned outside air into a production room can also control the temperature in the room. This is achieved by mixing outside air with room air in the system, cooling it to a temperature less than room design conditions, and then reheating it to remove even more moisture from the air, if needed.

If the system is located in an area where winter design conditions are below freezing, the system must contain a heat source. This will help prevent possible damage to water lines in the room, and help keep employees from experiencing conditions of extreme cold.

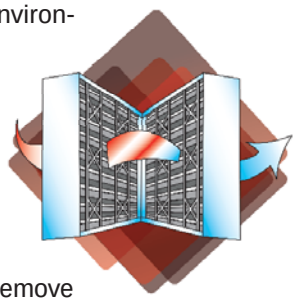
Air Change Rate

This refers to the amount of time required to circulate the entire volume of air through a specific room. For identically sized rooms, colder rooms will require a more aggressive air change as compared to warmer rooms. Also, after sanitation cycle, quicker air changes will reduce the time required to dry the process room.



Air Filtration

Filtration of the air is an often overlooked part of total conditioning of the processing room environment. Since the air supplied from the system mixes outdoor air with return air from the process room, it must be filtered properly to a level that ensures product quality.



Most systems will have commercial grade 30% filters as the first level of filtration in the process. These filters remove the larger particles and help extend the life of the more costly final filters. These filters are 30% efficient on a 1 micron particle, and are designed to be changed monthly. The second level of filtration in the system is matched to the specific process with the product in the room. Uncooked or raw product requires a level of filtration that is 95% (ASHRAE) efficient on a 1 micron particle, removing virtually all of the airborne yeast, bacteria and mold particles. Ready to eat, or cooked products typically require an even more stringent level of particulate removal. HEPA filters are rated 99.97% efficient on a 0.3 micron particle, and each filter is factory tested for efficiency. Installed properly, HEPA filters are designed to provide virtually sterile air for a critical process room.

Sanitary Design

Since the system is designed to supply properly conditioned air in a sanitary area, it must be designed to be sanitary itself. PH units have standard double wall construction, with an available stainless steel interior. The units are smooth wall constructed without interior fasteners. Each section has a stainless steel positive draining drain pan/floor to allow for prompt removal of any moisture and condensation from the unit in the process mode, and sized to provide quick solution removal during interior cleaning of the unit itself.

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