

Suppliers' Tips

What dryer features should I look for to maintain sanitary conditions during drying?

Whenever discussing dryer sanitation or, more appropriately, hygienic dryer design, first ask the question “How does the dryer need to be cleaned?” The answer to this question, in part, will determine the dryer’s hygienic design details. Wet-cleaned dryers promote good hygiene with features such as pitched roofs and floors to direct wash water to drains. However, a wet-cleaned dryer for a product that’s going directly into packaging will have a different level of hygiene than a dry-cleaned dryer with a post kill step in the production line.

When comparing both dryer types, you’ll find that they often have similar features to ensure hygienic operation, including:

- **Internal operator access.** This allows an operator to see and touch all dryer areas, especially food-contact areas or where moisture or debris can build up.
- **Smooth food-contact surfaces.** The food-contact surfaces should be smooth and non-absorbing and often require that special attention be paid to the surface finish. Most dryers have 300 series stainless steel food-contact surfaces with a 2B material finish to meet most standards for surface roughness (32-microinch Ra). Welds should be ground smooth to eliminate cracks and crevices, creating an easy-to-clean surface.
- **Internal air quality.** Dryers require that heated make-up air be forced through the material to remove moisture. As a result, this make-up air can be considered to be in direct contact with the food, requiring a higher filtration level to minimize contamination risk.
- **Properly placed dryer exhaust ducting.** This can be a difficult-to-recognize contamination area because the ducting located above the product zone can serve as a debris and bacteria collection point, posing a high contamination risk. Often, dryer ducting doesn’t have access doors, making them nearly impossible to clean or inspect, so proper placement away from the product zone is important.

Avoiding foreign material contamination requires regular inspections and moving parts maintenance. In a typical dryer conveying system, maintaining the oiling system is key to prevent generating foreign materials that can get into the food stream. Visual conveying system inspections, stationary and traveling product guides, and maintaining proper clearances helps to promote hygienic dryer operation.

If a dryer has an adjacent cooler, the contrasting climates can cause condensation to form at the interface. A hygienically designed dryer will include an insulated wall at this interface to minimize any condensation and hygiene risks associated with water in the drying process.

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Ensuring that sanitary spray dryer conditions are maintained during processing begins in the design phase. Using stainless steel for your application is essential. Installing HEPA filters will establish high-quality air for product drying and conveying. Properly sealed access ports, with functional gaskets, will prevent ingress of foreign material and maximize airflow through the system. Efficient

airflow reduces the risk of contaminants when processing multiple products in part by helping to minimize buildup. Lastly, designing a dryer-specific clean-in-place system will produce optimal cleaning and system sanitization.

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When drying heat-sensitive food materials, most companies choose a convection dryer (uses heated air to remove moisture) rather than a conduction dryer (uses an agitated bed with an indirectly heated wall to remove moisture). Assuming that you choose a convection dryer such as a vibrating fluid-bed dryer, a sanitary application requires overcoming major challenges, including the following:

Bacterial growth. The hot dryer atmosphere promotes bacterial growth. This means that equipment cleanability and sanitizing are major concerns. A well-designed clean-in-place (CIP) system with chemical and water rinse can automate the process. Avoid internal weld seams, cross braces, corners, and other potential dead spots where material can lodge and use a “gap-free” design with smooth, circular crevice-free internal surfaces.

Clean, conditioned air. The dryer’s inlet air filter should be HEPA quality. Some prefer HEPA filters before and after the steam-air heater to ensure contaminants from the air heater and ductwork gaps don’t reach the product.

Along with considering sanitary drying challenges, you should look for the following features in a sanitary fluid-bed dryer:

1. Designs that conform to 3-A, USDA, FDA, and BISSC standards.
2. A design with a long history of sanitary applications.
3. Test lab results to prove capacity and cleanability.
4. A circular fluid-bed design is inherently stronger and will minimize the need for explosion protection.
5. Plug-flow capability with uniform airflow distribution for consistent product moisture levels.
6. A cooling capability with conditioned air to reduce heat history and minimize caking.
7. A design that limits thermal damage and material degradation.
8. No dead spaces with a “gap-free” design to inhibit pathogens.
9. A dryer that has a CIP system and is easy to clean with quick internal access.

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