



Ultimate Guide

# Choosing the Right Door for Your Cleanroom Environment



# Introduction

Cleanroom environments, characterized by stringent cleanliness standards, play a pivotal role in industries such as pharmaceuticals, biotechnology, electronics, and aerospace. Within this meticulously controlled space, the choice of doors transcends mere practicality—it becomes a critical determinant of the cleanroom's efficacy, compliance, and operational success. This whitepaper explores the paramount importance of selecting the right door for cleanroom areas, delving into the repercussions of an ill-suited choice and providing a comprehensive guide on factors to consider.



# Trends in Cleanroom Environments

In the fast-paced industries of pharmaceuticals, electronics, and biotechnology, the pursuit of impeccable cleanliness standards is relentless. These sectors are constantly pushing the boundaries of cleanroom technology to meet the ever-increasing demands for precision, quality, and innovation.



## **Trend 1** *Flexible and Modular Designs*

The demand for flexibility in cleanroom facilities has led to the adoption of modular designs that allow for easy reconfiguration and adaptation to changing process requirements.

Industrial doors with modular construction enable swift layout changes, minimizing downtime and resource wastage associated with major remodeling. These flexible door solutions facilitate the seamless integration of new equipment or processes, ensuring optimal operational efficiency and adaptability in dynamic cleanroom environments.



## **Trend 2** *Emphasis on Energy-Efficient Cleanroom Technologies*

Cleanroom facilities consume considerable energy to uphold precise environmental conditions. To address this, the industry is adopting energy-efficient solutions such as HVAC systems, LED lighting, and smart controls to minimize energy consumption and operational costs while aligning with sustainability objectives.

Industrial doors contribute to this trend by incorporating advanced insulation materials, sealing systems, and smart controls, optimizing energy usage while maintaining the required cleanliness standards.



### **Trend 3** *Automation and Robotics*

The rise of automation and robotics is revolutionizing cleanroom environments, offering unparalleled precision and efficiency while minimizing contamination risks. By performing complex tasks with accuracy and freeing up human resources for more critical duties, these technologies are reshaping cleanroom operations

Industrial doors play a pivotal role in this trend by facilitating the seamless movement of automated equipment, ensuring controlled access, and maintaining cleanliness standards, thus contributing to the efficient operation of automated systems within cleanroom environments.



### **Trend 4** *Improve safety features*

In the ever-evolving world of cleanrooms, safety is paramount. Manufacturers are ramping up efforts to enhance safety features in cleaning equipment, focusing on ergonomic designs and integration with personal protective equipment (PPE). These innovations not only protect cleaners but also preserve the sterile environment.

Industrial doors play a crucial role in this trend by providing secure access points and minimizing the risk of contamination. With features like smooth operation, automated controls, and safety features like photo eyes, light curtains, motion detectors, industrial doors ensure the safety of personnel while preserving the cleanliness of the cleanroom environment.



# Challenges of cleanrooms

In the realm of cleanrooms, regulatory compliance stands as a cornerstone challenge for facility managers and operators. Ensuring adherence to stringent standards and guidelines is not only essential for product quality and safety but also critical for maintaining the integrity of cleanroom operations.



## ***Contamination control***

Controlling contamination is one of the primary challenges in a cleanroom environment. The tiniest particle holds the potential to disrupt the delicate balance of the manufacturing process and jeopardize the quality of the end product. To conquer this challenge, implementing a robust contamination control program is imperative.



## ***Temperature & Humidity***

Ever wondered why maintaining precise temperature and humidity levels is crucial in semiconductor manufacturing? Fluctuations in these parameters can significantly impact the performance and reliability of fabricated chips.



## ***Energy Efficiency***

Cleanrooms are notorious energy consumers, thanks to their stringent environmental requirements. Balancing the need for precise conditions with energy efficiency poses a significant challenge. However, implementing energy-efficient practices and equipment can mitigate this challenge.



## **Regulatory Compliance**

Meeting regulatory standards is fundamental for any cleanroom facility, presenting a perpetual challenge amidst evolving best practices, technological advancements, and regulatory updates. Facility managers must navigate a complex landscape of regulations, with key standards including:

- **International Organization for Standardization (ISO):** ISO 14644 establishes universally recognized guidelines for cleanroom classification, categorizing them from Class 1 (cleanest) to Class 9 (dirtiest).
- **Current Good Manufacturing Practice (cGMP) Guidelines:** These guidelines outline specific requirements for cleanroom design and operation, including the use of anti-microbial doors and walls treated with chemical agents for cleanliness maintenance.
- **Hazard Analysis and Risk-based Preventive Controls:** Regulations such as 21 CFR Part 117 and 21 CFR Part 820 (cGMP) Subpart G regulate the development, maintenance, and production controls of cleanrooms, particularly in food processing facilities.

# The Impact of Not Having the Right Door

Closing a door is one thing; closing a door in a strictly hygienic environment is another. This statement encapsulates the pivotal role that industrial doors play in cleanroom applications within healthcare, research, and pharmaceutical environments. In these controlled settings, where even the slightest contamination can have far-reaching consequences, the choice of doors is crucial for maintaining the required standards of cleanliness, hygiene, and operational efficiency.



## **Contamination Risks**

Inadequate doors may allow the ingress of particulate matter, microbes, and other contaminants, jeopardizing the sterile conditions vital for critical processes. Moreover, a mismatched door may result in failure to maintain the prescribed cleanroom classification, risking non-compliance with industry standards and regulatory requirements.



## **Environmental Stability Challenges**

Improperly sealed doors can lead to variations in temperature and humidity, undermining the stability required for sensitive manufacturing processes. Additionally, the absence of effective door sealing mechanisms may disrupt the carefully controlled pressure differentials, introducing uncontrolled airflow and compromising cleanroom integrity.



## **Operational Disruptions**

Inefficient door types can impede the smooth flow of personnel and materials, affecting the overall efficiency of cleanroom operations. Furthermore, doors not designed for seamless integration with cleanroom processes may pose safety risks to personnel, leading to potential accidents and contamination incidents.





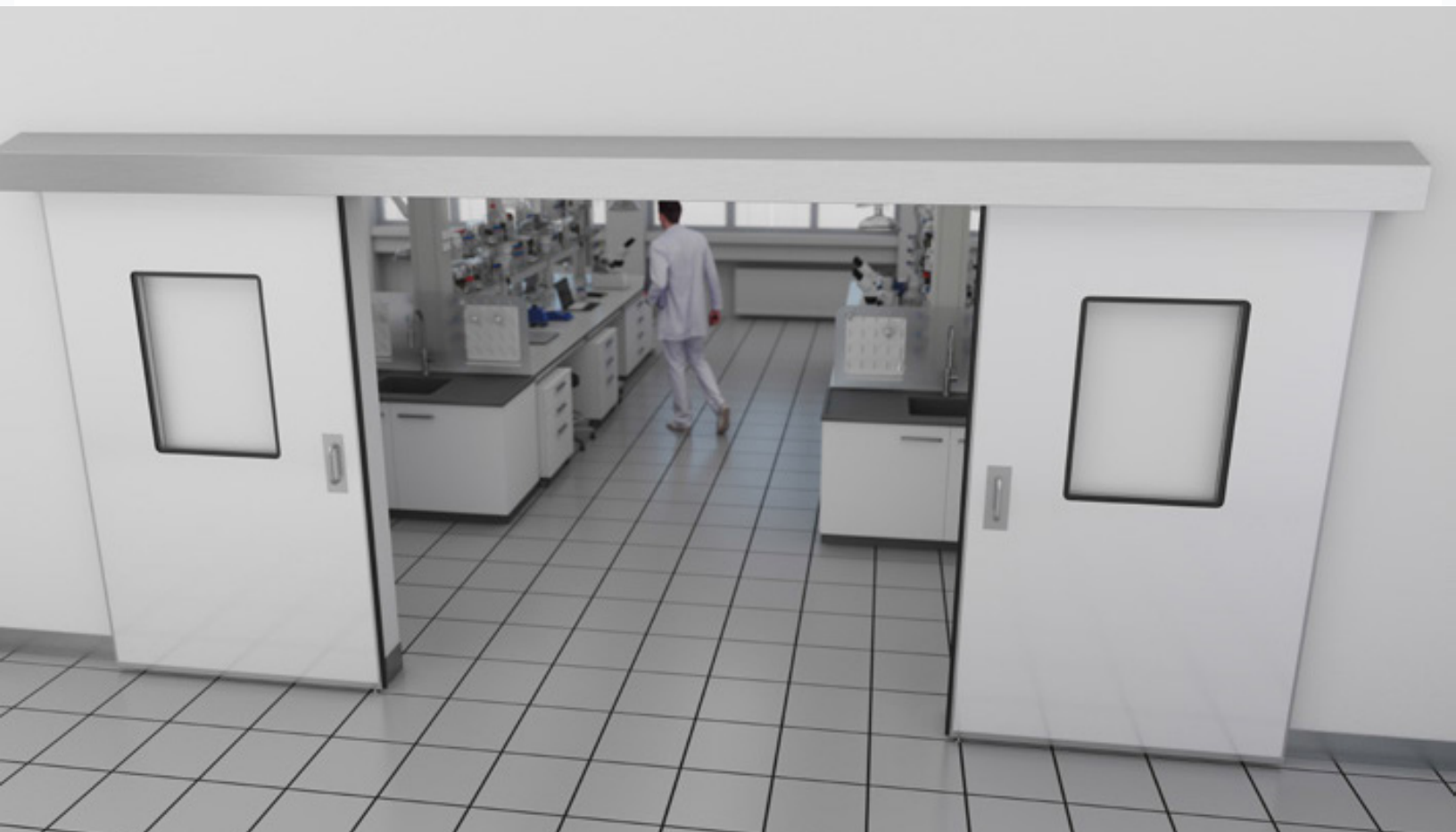
### ***Non-Compliance with Regulatory Standards***

The use of inappropriate industrial doors can lead to non-compliance with stringent regulatory standards governing cleanroom environments. Regulatory bodies such as the FDA and ISO set forth specific guidelines regarding cleanliness, air quality, and operational practices. Failure to adhere to these standards due to suboptimal door choices can result in regulatory penalties, product recalls, and damage to the reputation of the facility.



### ***Increased Maintenance Costs***

Industrial doors that are not well-suited for the cleanroom environment may suffer from premature wear and tear. Exposure to cleaning agents, disinfectants, and constant operation in high-use areas can lead to frequent maintenance expense. The financial impact of increased maintenance costs, coupled with potential downtime for repairs, underscores the importance of choosing doors that are durable and compatible with the cleanroom environment.







# *What to Consider When Choosing the Right Door*

Here are a few of the top questions we ask when someone is looking for a cleanroom door.

## ***What type of traffic uses the opening?***

When selecting doors for cleanroom environments, it's crucial to consider the nature of traffic in the area. For pedestrian-only access, swinging doors are ideal due to their smaller size, while areas frequented by forklifts may benefit from sliding doors for efficient and quick access. Assessing the traffic flow ensures that the chosen door type aligns with the operational needs of the cleanroom while maximizing safety and efficiency.

## ***How frequently is the door accessed?***

Consider the frequency of door usage when selecting the appropriate door type for your cleanroom environment. In low-traffic areas, a manual door may be sufficient, while high-traffic areas could benefit from fast-moving doors equipped with touchless activation devices and safety features to boost productivity. Assess the impact of the door on productivity based on traffic flow, with high-traffic areas potentially benefiting from automated doors with swift cycle times to minimize disruptions and enhance overall efficiency.

### ***What safety features are necessary for the door?***

When selecting a door for your cleanroom environment, carefully evaluate the need for safety features, particularly in high-traffic areas. Fast-moving doors should be equipped with sensors and safety mechanisms to prevent accidents and prioritize the well-being of personnel. Investing in doors with robust safety features helps to mitigate risks and maintain a secure working environment within the cleanroom facility.

### ***What is your budget for the door?***

Consider your budget carefully when choosing a door for your cleanroom. While opting for a cheaper option initially might seem appealing, evaluate the long-term costs including maintenance and durability. Investing more upfront in a durable door can lead to greater cost-effectiveness over time. Additionally, factor in installation, maintenance, and potential energy savings to assess the total cost of ownership. By balancing upfront costs with long-term expenses, you can make a financially savvy decision that meets your cleanroom's needs while staying within budget constraints.

### ***Is the door material suitable for cleanroom conditions?***

Assess if the door material is suitable for cleanroom conditions by considering its resistance to chemicals, moisture, and corrosion. Also, evaluate its impact on maintaining stable temperature and humidity levels critical for sensitive manufacturing processes. Choosing a door material that meets these criteria ensures cleanliness standards and optimal cleanroom performance.

### ***How much space is there available for a door?***

Consider the available space when selecting a door for your cleanroom. Traditional double sliding doors typically require significant wall space to accommodate the track and rigid panel necessary for door operation. For instance, a door with a six-foot clearance will need approximately three feet of wall space on either side. Alternatively, fabric roll-up doors offer a space-efficient solution, as they collect at the top of the entrance's frame within the head assembly.

Additionally, modern sliding doors with glass windows are more compact and require less room than older models. Double-sided curtains also provide a space-saving alternative to fabric roll-ups. By considering the available space and exploring various door options, you can choose a solution that maximizes space utilization while meeting your cleanroom's requirements.



## *Type of Cleanroom Doors*

In the design and operation of cleanrooms, the choice of doors plays a critical role in maintaining cleanliness, controlling contamination, and ensuring efficient workflow. Various industrial doors are available, each offering unique features and benefits tailored to cleanroom environments. Among these options are swing doors, sliding doors, and high-speed doors.

These doors are carefully selected based on factors such as traffic flow, space constraints, contamination control requirements, pressure differentials, and workflow efficiency. Each type of door offers distinct advantages depending on the specific needs and objectives of the cleanroom facility.

Let's explore the characteristics and considerations associated with swing doors, sliding doors, and high-speed doors in cleanroom applications.

	<i>Swing door</i>	<i>Sliding door</i>	<i>High speed door</i>
<b>Traffic Flow</b>	Suitable for moderate traffic flow	May be preferred for spaces with limited clearance or frequent access	Ideal for high-traffic areas requiring rapid access
<b>Space Constraints</b>	Require clearance for swinging into the room	Suitable for limited space as they operate without swinging into the room	Space-saving option, operating without swinging into the room
<b>Contamination Control</b>	Limited control due to longer open/close times	Better control with quicker opening and closing times, reducing the risk of contamination entering the cleanroom	Quick opening and closing minimizes the time doors are open, reducing the risk of contamination
<b>Pressure Differentials</b>	Effective sealing mechanisms may be necessary to maintain pressure differentials when closed	Effective sealing mechanisms may be necessary to maintain pressure differentials when closed	Generally considered for maintaining pressure differentials when closed; rapid operation helps maintain desired pressure differentials
<b>Workflow Efficiency</b>	May cause wait times due to slower operation	Can enhance efficiency by minimizing wait times for access	Enhances efficiency by minimizing wait times for access; particularly beneficial in environments where rapid access is critical to maintain cleanliness and productivity
<b>Overall Consideration</b>	Suitable for areas with moderate traffic flow, where contamination control and pressure differentials are less critical, and space constraints allow for swinging	Suitable for spaces with limited clearance, requiring effective sealing mechanisms to maintain pressure differentials, and where sliding operation is preferred	Ideal for high-traffic areas where rapid access, contamination control, and maintaining pressure differentials are critical, and space constraints necessitate a non-swinging door solution



## *Our Cleanroom Environment Doors*

Introducing our Jamoclean line of cleanroom environment doors, meticulously designed to meet the stringent requirements of controlled environments while ensuring seamless operation and durability.

### *Jamoclean for the Most Demanding Environments*

At the core of our Jamoclean doors lies our innovative CleanDrive Technology, a cutting-edge automation system engineered for reliability and efficiency. With its slim profile and robust construction, CleanDrive ensures optimal performance with minimal downtime, essential for maintaining the integrity of your cleanroom environment.



#### ***Jamoclean Swing Doors – Streamlined accessibility***

Experience effortless accessibility with our Jamoclean Swing Doors, designed to provide swift and seamless entry and exit within your cleanroom facility.

- Ease of access
- Emergency exit capability
- Extra compact design
- Brushless motor technology
- Available in single or double leaf configurations
- Option for manual or power operation



### ***Jamoclean Sliding Doors – Effortless control***

Take command with our Jamoclean Sliding Doors, offering effortless control and exceptional sealing for your cleanroom environment.

- Controlled access for enhanced security
- Full perimeter weather seal for optimal containment
- Smooth operation along sleek tracks
- Sleek and appealing design to complement any space
- Maximum quietness for minimal disruption
- Equipped with smart battery technology for uninterrupted functionality

## ***High Speed Doors for Pressure-Controlled Environments***



### ***Dynamicroll ® Cleanroom - Rapid Access and Containment***

Engineered to provide rapid access and superior containment in cleanroom environments, ensuring efficiency and cleanliness are upheld at all times.

- Selfrepairing
- Swift access
- Low maintenance
- Available in fully RVS
- FDA certified curtain material available



# *Ready to Get The Right Door? Get in Touch!*

At Jamison, we're here to help you protect what matters most! Starting with choosing the perfect door for your cleanroom.

As you've seen, the decision isn't always straightforward, and various factors must be carefully considered to ensure optimal performance and efficiency.

We're here to partner with you in designing smarter, safer, and more efficient solutions to protect your people, products, and profits. With our expertise and commitment to excellence, we'll work closely with you to assess your unique requirements and recommend the most suitable door options for your cleanroom environment.

When you choose Jamison, you're getting reliable delivery times, top-notch products, and service that goes above and beyond. Our doors are designed to fit seamlessly into any setting, giving you peace of mind that your cleanroom is well-protected and ready for action.

Don't hesitate to reach out to us today to discuss your cleanroom door requirements. Let Jamison be your trusted partner in safeguarding what matters most.

***Need to get in touch?  
Contact Us Today!***

