Key Considerations:

When Purchasing Your Biological Safety Cabinet

The purchase of a biological safety cabinet should be made with much consideration. These cabinets serve as the Primary Engineering Control as the first line of defense in providing personnel, environmental and/or product protection against biohazards and potentially harmful agents in a range of laboratory, research, clinical and industrial settings.

environmental, product & personnel protection

To ensure that your laboratory is functioning properly at a high safety level, providing a high-level biological safety cabinet that helps facilitate an optimum working environment -- requires doing some investigation. A clear understanding of the important role these cabinets play in research and clinical environments will help ensure your laboratory is prepared to make sound, fact-based decisions regarding the biological safety cabinets that will best meet your current and anticipated needs.

What is the value of a biological safety cabinet?

So why a biological safety cabinet? And why is it required to be knowledgeable about the cabinet before making a decision on what type of cabinet to purchase?

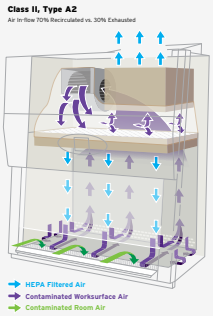
Laboratory safety or the need to protect personnel and the environment from exposure to biohazards has never been more pressing. In our increasingly globalized world, a range of factors has increased the potential risks that biohazards pose. Today's antibiotic-resistant bacteria like Methicillin-resistant Staphylococcus aureus (MRSA) as well as rapidly mutating viruses, such as Ebola or HN51, pose an increasing risk to laboratory personnel safety. Meanwhile, increased international trade also means considerably more transportation of biohazards to testing labs and research centers with a greater chance of a pathogen being improperly handled and people being exposed.

Recently, the risk of laboratory exposure made headlines with two incidents at Centers for Disease Control and Prevention (CDC) laboratories. The CDC announced improper handling of anthrax and avian flu at its laboratories. The agency has since released a full report on the incidents and announced new actions and procedures that have been implemented to reduce the possibility of future problems. However, the incidents provide an urgent call-to-action to ensure that laboratories, and other environments in which biological materials are handled, have performed a relevant risk assessment, procure proper state-of-the-art engineering controls, and increase vigilance to mitigate contamination exposure that would potentially put personnel, the environment and others at risk.

The laboratories safety starts with risk assessment and followed closely with engineering controls, the primary being the biological safety cabinet, plays a key role in ensuring that infectious "microorganisms" and potentially harmful particulates and/or aerosols can be handled safety.

Specifically, biological safety cabinets commonly use High Efficiency Particulate Air (HEPA) filters for biohazards in their exhaust and/or supply systems to provide safe, particle-free air. It is these cabinets that provide a safe, secure way of handling materials until they can be used properly or disposed of according to industry guidelines.

The Class II, Type A2 Biological Safety Cabinet uses HEPA filters in both the supply and exhaust system to produce and maintain product, personnel, and environmental protection.



Determining Your Specific Needs

Biological safety cabinets are used in a wide range of laboratory environments for life science, clinical and industrial applications. The type of environment -- and the specific applications that will be performed -- are key considerations in dictating which type and classification of cabinet will best meet the needs of workers, while providing optimum protection.

The first step is preform a detailed risk assessment with a Certified Biosafety Safety Professional (CBSP) or Industrial Hygienist who has knowledge of the risk levels associated with specific biological materials and chemicals that may be used in a laboratory setting. This will help to determine the type of materials used in the cabinet as well as the potential risks. The risk assessment should focus on three critical areas:

I. Personnel protection from harmful biological agents inside the cabinet.

II. Product protection to avoid cross contamination of the work, experiment or process being performed.

III. Environmental protection from contaminants that are used within the cabinet.

Each of these areas contain specific risks, underscoring the importance of giving each full consideration when developing the risk assessment. Critical to a successful risk assessment is making sure the input you receive is comprehensive from your Certified Biosafety Safety Professional (CBSP) or Industrial Hygienist.

Class Considerations for Biological Safety Cabinets

After determining your specific risk, the next step is to assess how those risks will be fully met by the proper class and type of Biological Safety Cabinet to be purchased. There are different Classes of biological safety cabinets based on the level of protection they are required to provide. In addition, within those classes are various Types designed to address specific needs. The National Sanitation Foundation (NSF) has established performance standards that cabinets must meet to be Classified and listed as a specific Type of cabinet.. The *standard NSF/ANSI 49 for Biosafety Cabinetry* is reviewed every five years and it's recommended to certify your cabinet on an annual (according to NSF/ANSI 49) to biannual basis (according to standard USP <797> for Compounding Pharmacy Products). In addition to on-site staff, it is required to solicit input from a qualified biosafety officer as well as Environmental Health and Safety (EHS) professional. It is smart as well to seek out product performance information from technically competent manufacturing representatives to assist with cabinet selection.

Below is a high-level overview of Biological Safety Cabinet classifications.

- Class I – Offers personnel and environmental protection only. Personnel protection occurs by constant movement of air into the cabinet and away from the user. Meanwhile, the environment is protected by filtering air before it is exhausted. A Class 1 cabinet does not protect the product from contamination. As such, a Class 1 cabinet is suitable for work involving low to moderate risk agents where there is a need for containment, but not product protection. *Learn more how Class I Biosafety Cabinets work.*

- Class II – A Class II Biosafety Cabinet must meet established safety requirements for protection of product, personnel and the environment as defined by NSF/ANSI, EN12469 or another internationally recognized organization. A Class 2 cabinet provides personnel, product, and environmental protection through HEPA filtration, laminar airflow throughout the work

surface, and an air barrier at the front of the cabinet by use of a vacuum. Within the Class II classification, sub-categories have been established to define specific Types of Class II Cabinets, in terms of design, performance and installation attributes in which varying degrees of air recirculation or exhaust airflow is required. Use of materials that generate gases or vapors require an exhaust connection to a facility exhaust system. *Learn more how Class II Biosafety Cabinets work.*

- Class III - The Class 3 cabinet was designed to work and handle highly infectious microbiological agents, unknown agents, and/or to conduct hazardous operations providing maximum protection for personnel and the environment. The Class 3 cabinet is completely gas tight providing access to the work zone only through an isolation area that can be routinely decontaminated between uses. Personnel access the work zone to manipulate agents through heavy duty rubber gloves. Exhausted HEPA filtered air must pass through two additional HEPA filtered or a HEPA filter and air incinerator before being discharged back into the outdoor environment. *Learn More how Class III Biosafety Cabinets work.*

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Design and Construction Considerations

Once the specific Class and Type of Biological Safety Cabinet is determined, the next key consideration is whether the cabinet might be the proper fit for the laboratory environment and also if the cabinet configuration will have the flexibility required to meet present and future challenges within a specific laboratory. Among the questions to consider:

- Is the cabinet ergonomically designed in a way that allows for optimal comfort for those working?
- Can the cabinet be configured to improve process, productivity and safety?
- Does it have state-of-the-art safety features (i.e. audible and visual airflow alarms) and accessories to ensure the safest environment for lab personnel?
- What are the design specifications and materials and how do they compare with other products on the market?

Aligned with those questions, some specific considerations include:

- Ergonomics – Is the cabinet designed to meet the ergonomic needs of the intended users?
- Width of cabinet – Is the width appropriate for the intended application and will it fit in the available space?
- Base stand options – A range of options exist including fixed (sitting or standing height), telescoping, adjustable, etc.
- User friendly – Is the cabinet easy to access, and help facilitate work?
- Service/maintenance friendly – Is the cabinet easy for an accredited Certifier to maintain and certify? Does the manufacturer provide any service assistance? At what level? Is the manufacturer easy to contact?
- Energy efficiency – What are potential costs of operating the cabinet from an energy consumption perspective?
- Filter life – How long will filters last in comparison to other brands?
- Noise levels – Is the noise level distracting?

- Lighting – Is the lighting adequate for the most efficient handling of materials?

- Total cost of ownership – What are the estimated costs over the lifetime of the cabinet's operation, as opposed to only considering upfront costs?

Training

The best biological safety cabinet in the world is only as good as those who are using it. That means proper education and training are essential to ensure the cabinet operates to its full potential. The laboratory director and qualified biosafety professionals should ensure the proper training of personnel. They should also establish and continually update policies, procedures and Standard Operating Procedures (SOP) to ensure that only those with proper training and clearance are permitted to enter the lab and work in Biological Safety Cabinets.

Typically, a reliable manufacturer will provide appropriate upfront training and education during the purchasing, installation and operation process. *Watch NuAire's Working Safely Series.* Check out their track record of ensuring personnel are aware of the necessary training.

In addition, the process doesn't end once a biological safety cabinet is purchased, installed and operational. Closely review what the manufacturer offers in terms of ongoing support. What are the specifics of the warranty? What is included (parts, labor)? For how long? Etc.

Further, consider how long the company has been in business and its reputation for building and maintaining quality products and service.

Conclusion

Ultimately, the effective purchase of the proper biological safety cabinet is a team effort that involves capturing input from a range of individuals and professionals who can offer insights and expertise that will help guide the purchase decision.

Much like the procedures and experiments being performed in the laboratory itself, a systematic approach is best. Develop a strong working knowledge of biological safety cabinets as the primary engineering control in the laboratory, perform a thorough risk assessment, determine the Class and Type of cabinet required and assess the critical needs of the users. Also make certain that adequate and ongoing training will be provided and have a clear understanding of the support that is offered after sale and installation of the cabinet.

By taking these steps, you will not only be in the position to make a wise and informed purchase, but also ensure the safety of your personnel and working environment.

Have questions? Want to Learn More?

Contact us online or by phone 763-553-1270

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