



How Efficient Is Your Biosafety Cabinet?

Biosafety cabinets that work for you and the environment

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Biosafety cabinets (BSCs) are some of the most common pieces of equipment in biological labs. Not only do they provide a sterile environment to handle cells and tissues, but they also help to protect experimenters from biological aerosols, splashes and spills, and the environment from biological contaminants. They provide these functions primarily through the use of high efficiency particulate air (HEPA) filters that block the entry and exit of particles that are larger than 0.3 μm .

Across the world, research institutes are realizing the environmental impact of their science and are trying to reduce their carbon footprints. BSCs tend to generate a large amount of heat due to the need to maintain continuous airflow to provide a sterile environment, and there is great incentive to make biosafety cabinets more energy

efficient, which would translate to cost savings for labs and a smaller environmental footprint.

Motor system

BSCs continuously regulate the flow of gases to maintain sterility. This is achieved in conventional BSCs by using alternating current motors that run at a fixed speed. However, in times when the flow of gases has to be slower, such as when users have to work on other experiments and close the sash, alternating current motors are unable to run on less current supply. Instead, they convert the extra current to heat which wastes energy and requires additional cooling, which also consumes energy.

Newer BSCs are equipped with direct current motors that are more energy efficient as they can easily run on different current supplies. For instance, when the HEPA filters become loaded with particulates, the motor can draw on more current to run at a faster speed to maintain the critical airflow rate. The use of direct current motors also helps to reduce the possibility of contamination from imbalanced airflow.

Programmable functions

Most BSCs contain ultraviolet lamps that can be used to sterilize surfaces. In older designs, users often have to decide between waiting in the lab for a few hours while ultraviolet sterilization is completed, or leaving the lamp turned on overnight. This wastes energy and also wears out the lamp quicker. Alternatively, newer BSCs come with programmable functions such as scheduling ultraviolet sterilization with a user-defined duration and time.

Ergonomic designs

BSC manufacturers have also innovated in other aspects—for instance, designing more ergonomic layouts so that users are less likely to block the airflow with objects. Consequently, the motor system does not have to consume so much energy to compensate for disrupted airflow. Newer BSCs also come with ‘quick start mode,’ which

enables certain functions to be turned on and off more quickly. One such example is the fast movement of the sash to its correct starting position. Traditional BSCs require manual intervention to adjust the height of the sash—and due to human error, the sash may not always be adjusted to its optimal height. This can lead to disrupted airflow and requires more energy to run the BSC. In ‘quick start mode,’ the sash is instead programmed to move to the optimal height quickly and automatically to minimize disrupted airflow and maximize energy savings.

BSCs are an important tool in biological labs and their use has facilitated great scientific discoveries. However, like many other tools, including centrifuges and cell culture flasks, [their design and function will have to evolve](#) to meet the needs and concerns of their users. A more energy efficient biosafety cabinet is a win-win for both science and the environment.

For additional resources on biosafety cabinets, including useful articles and a list of manufacturers, visit www.labmanager.com/BSCs

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