



TECHNICAL BULLETIN : GENERAL INFORMATION

WHEN SHOULD WE REPLACE OUR BIOLOGICAL SAFETY CABINETS

Use of modern day Biological Safety Cabinets (BSC's) began in the early 1970's with BSC's that were manufactured to the NIH-03-112C Standard and subsequently the NSF Standard 49. BSC's manufactured in the 70's, 80's and early 90's have provided well over 20 years of service.

BIOLOGICAL SAFETY CABINETS HAVE A 15 YEAR USEABLE LIFE

Several considerations should be made of BSC's in this age group.

- Will the BSC need extensive service?
(i.e. HEPA filter replacement, blower/motor replacement, electrical system replacement? etc.).
- Can an older BSC be commissioned after it has been in storage or purchased as a resale?
- Will original test reports/manuals be available or will the BSC be commissioned to current NSF standards?

After 20 years, replacement parts may or may not be available due to electrical or mechanical changes at the factory or industrial part suppliers. For example, magnetic ballasts and T12 fluorescent bulbs are no longer readily available since the year 2010.

In addition, today's BSC's have evolved through the years with many improvements in safety containment performance, ergonomics, serviceability, and energy efficiency that should be considered in a repair versus replacement decision.

IMPROVEMENTS IN SAFETY CONTAINMENT PERFORMANCE has been driven by many factors over the years. Product design, airflow optimization, improved HEPA filters and testing methods have all had a major impact on safety containment performance improvement. However, the single largest impact was the 1992 Revision of the NSF Standard 49. BSC's that were submitted to NSF for product testing after 1992 had several new tests performed on them that required each manufacturer to adjust and/or improve their BSC's to assure compliance to the revised standard. These new tests included direct inflow measurement of inflow velocity, motor/ blower performance and biological safety containment performance tolerance testing. As stated above, each of these new tests provide a higher level of safety containment performance. The direct inflow measurement test provides the certifier a more accurate and consistent method to assure proper airflows are being set during the certification process. The motor/blower test assures a minimum HEPA filter loading capacity (NuAire provides greater loading capacity). The biological safety containment performance tolerance test assures maximum product and personnel protection through the entire settable airflow range optimizing containment performance. While the previous NSF standard only required biological testing at the nominal airflow setpoint. The revised standard requires biological testing at multiple airflow setpoints challenging the BSC for abnormal airflow conditions that provides a more robust safety containment system.

Since the revised standard was effective in 1992, any BSC submitted after 1992 would include these new tests. The exact date and models for each manufacturer are different based on their product submittal to NSF.

Below is a chart for NuAire product revisions based on the NSF submittal time frame.

Cabinet Type	Model Number	Production Start Date	Product Series	Cabinet Type	Model Number	Production Start Date	Product Series
A2	NU-425-series	February 1995	20	B2	NU-430-series	June 1996	20
A2	NU-437-series	May 2001	1	B2	NU-435-series	June 1996	20
A2	NU-440-series	February 1995	1	B1	NU-427-series	June 1997	23
A2	NU-407-series	October 1998	35				
A2	NU-540-series	December 2014	1				
A2	NU-543-series	November 2014	1				
A2	NU-545-series	September 2014	1				

IMPROVEMENTS IN ERGONOMICS also were incorporated into the BSC’s during the product revision to the 1992 NSF Standard 49. The base product improvements for ergonomics were substantial in improving user comfort. Four key elements were changed, increasing the effective work area, forearm support, expanded vision zone, and optimal posture with adjustability. The increase in the effect work area means more work area without having to reach for work materials. This was accomplished by optimizing the work access/front grill area to allow the work materials to be closer to the cabinet user. Along with the work access opening, a non-metallic forearm support was added to provide a large flat area for a user’s forearm to rest eliminating pressure points and cold metal contact. Expanded vision zone means the elimination of the traditional bottom window metal edge protector being replaced by a ground and polished edge for unobstructed vision. Additional viewing area height was also added. Providing the means for optimal posture was accomplished by reducing the depth of the plenum below the worksurface providing more knee space. In addition, today there are more basestand options that can provide adjustability for each cabinet user. With the above ergonomic improvements, today’s BSC provides for improved safety conditions and improved productivity for the cabinet user.

IMPROVEMENTS IN ENERGY EFFICIENCY also been made during this same time frame. Optimization of the airflow system including the motor, blower and HEPA filter was accomplished by working closely with our suppliers to meet our design specifications to maximize energy efficiency, improve performance and capacity. The largest improvement was in the use of the DC ECM motor versus the traditional AC motor. The Direct Current (DC) Electronically Commutated Motor (ECM) was developed by General Electric in the 1990’s to improve the energy efficiency for the residential Home Ventilation and Air Conditioning (HVAC) products who also used the same traditional AC motor as BSC’s. The DC ECM motor consumes 50% less energy, extends motor rpm range improving capacity and is controlled by a microprocessor based system to provide constant air volume to the system to automatically compensate for filter loading. NuAire incorporated the use of the DC ECM motor in 2009. In addition to the airflow system, the fluorescent lighting system was also upgraded to utilize the latest technology of electronic ballasts and T8 fluorescent bulbs versus the older magnetic ballasts and T12 bulbs. Even more recently, LED (T8) style lights are becoming more available and cost effective offering an additional 50% energy savings on the lighting system. Manufacturers of magnetic ballasts through federal energy legislation have stopped producing them since the year 2010. For this reason, along with increased energy efficiency, NuAire choose to incorporate the new electronic ballast design along with a LED option for all models. Also at this same time, NuAire chose to incorporate a more robust wiring system for more reliable wire connections and terminations. These changes along with general improvement in the electrical systems represents greater than a 50% overall energy savings over NuAire pre 1995 BSC’s.

IMPROVEMENTS IN SERVICEABILITY was also made during this same timeframe. External adjustment of the exhaust choke screw, improved front filter access, improved blower mounting and improvement of the wiring system all aid to reduce service and/or certification time resulting in lower maintenance costs.

CONSIDERATIONS FOR REPLACEMENT OR REPAIR

Consult with your institutes Environmental Health and Safety Department, an Accredited Certifier currently performing the BSC maintenance, your areas NuAire Sales Representative, and/or the NuAire Technical Service Department. NuAire will continue to support older BSC’s if possible with common replacement parts such as HEPA filters, motor speed controls, motor/blowers, fluorescent and ultraviolet bulbs as long as we can source these parts from our vendors. If you have further questions, please contact NuAire Technical Service Department.