The Whitley Internal HEPA Filtration System fitted to Whitley Anaerobic Workstations

Background Information

HEPA is an acronym for High Efficiency Particulate Air, or High Efficiency Particulate Absorption, and is a type of filter.

To qualify as a HEPA filter, a filter must meet defined international standards of efficiency. HEPA filters must remove extremely high percentages of any particles above a defined size contained in the atmosphere passing through them.

Several international standards exist, yet none of them recognise the unique functionality of modified atmosphere workstations operating under a slight positive internal pressure.

No manufacturer of modified atmosphere workstations operating with a positive internal pressure can comply with all the requirements of any of the recognised standards of atmospheric cleanliness. Some tests and requirements are simply not relevant.

For example, these standards stipulate that particulate measurements must be taken after a single pass of the atmosphere through a filtration system. The standards do not take into account the levels of atmospheric cleanliness that can be achieved when the same atmosphere is continuously re-circulated.

Because there is no one recognised standard covering all functional aspects of positive pressure modified atmosphere workstations, we selected to work to the atmospheric cleanliness requirements of ISO 14644-1. Within this standard there are nine classification levels for atmospheric quality. Class 9 is the lowest standard, Class 1 is the highest standard. It should be remembered that international standards are reviewed from time to time and particulate levels permitted within specific categories of performance may change.

For reference one micrometre (commonly referred to as a micron, identified by the symbol µm) is 1/1000 of 1 mm. Bacterial cells have a typical diameter in the order of 1µm.

We achieve levels of atmospheric cleanliness inside our workstations exceeding the requirements of ISO 14644-1 Class 3 based upon our measurement of particles from 0.3µm and above. We can provide proof of atmospheric cleanliness. None of our competitors make equivalent claims.

Another very important aspect of the performance of HEPA filters in closed systems is that particulate levels must return to the level defined by a specific Class within 20 minutes of the conclusion of a period of activity. Our workstations meet this requirement in less than half the stipulated time. Our competitors make no similar claims.

The Whitley Internal HEPA Filtration System

In Whitley Workstations fitted with our unique Whitley Internal HEPA Filtration System, constant movement of the internal atmosphere ensures any internal particulate matter above 0.3µm in size will remain in motion until trapped by the HEPA filter and prevented from further movement.

Carefully selected HEPA filters are placed within the internal atmospheric flow path. Powerful fans compensate for the restriction in flow that occurs naturally as a consequence of introducing any filter.

As far as we can determine, the performance of the Whitley Internal HEPA Filtration System is significantly superior to that provided by any competitor product.

There are two principle reasons for this:

- **Firstly, our competitors draw atmosphere out of the workstation and pass it through an external HEPA filter**

  This approach greatly increases the time it takes to clean the atmosphere and the HEPA filter quickly becomes saturated due to a build up of moisture – and is rendered ineffective.

  The Whitley System utilises an internal HEPA filter. The atmosphere is cleaned quickly and continuously because the entire internal atmospheric volume of every Whitley Workstation passes through the filter 15 times per minute – once every 4 seconds.

  The atmosphere passing through the filter creates a laminar flow-like effect covering around 94% of the width of the chamber.

  The position of the Whitley HEPA filter ensures it cannot get wet. Therefore it cannot become saturated with moisture and rendered ineffective.

- **Secondly, our competitors use off-the-shelf filters**

  We have worked with one of the world's leading filter manufacturers to develop a filter specifically tailored to suit the requirements of anaerobic workstations.

All Whitley Workstations are positive pressure devices. They are not designed to provide user protection as they permit the internal atmosphere to be released into the laboratory. Our workstations are designed to provide the highest possible atmospheric quality for product and sample protection and internal working conditions. We make no claims for user protection.

However, of significant interest we have completed a test programme to validate the removal of bacterial cells and spores from the chamber. These tests have demonstrated that aerosols and bacterial spores are removed by our HEPA filtration system, thereby preventing the contamination of any media present in a workstation.

The very positive results achieved during these tests were presented at Anaerobe 2014, Chicago, USA. A copy of the presentation may be downloaded from our website on: Products> Whitley HEPA Workstations>Whitley H35 HEPA Workstation> Downloads.

The Whitley A35 Anaerobic Workstation is the first of our anaerobic workstations to be equipped with the Whitley Internal HEPA Filtration System.

Independent verification and validation testing of the Whitley Internal HEPA Filtration System will be sought.

Conclusion

We are confident that our thorough approach to product development and product testing has resulted in a HEPA filtration system superior to any other systems fitted to positive pressure anaerobic workstations produced by other manufacturers.