Impact of Improper Replacement of HEPA Filters in Class II Biological Safety Cabinets

Eng. Mohamed Abdel Wahab Abdel Maksoud
RLQP, AHRI, Giza

Objectives:

- Discuss the impact of improper replacement of HEPA filters in class II biological safety cabinets.
- Share RLQP experience in HEPA filter replacement.

Material and methods:

High Efficiency Particulate Air (HEPA) filters provide a very high level of filtration efficiency for the smallest as well as the largest particulate contaminants. As defined by the Institute of Environmental Sciences and Technology, IEST-RP-CC001.3 and MIL-STD-282 Method 102.9.1, a HEPA filter must capture a minimum of 99.97% of contaminants at 0.3 microns in size.According to NSF/ANSI 49, HEPA filters used in biological safety cabinets must conforms to IEST type C (minimum particulate removal of 99.99% for thermally generated monodispersedioctylphthalate (DOP) smoke particles or equivalent with a diameter of 0.3 μm).Due to the design of HEPA filters, resistance to the air flow is created with a dramatic fall in the differential pressure across the filter, as particulates build up on filter fibers increasing itswhich makes it harder to push the same amount of air through the filter. According to NSF/ANSI 49, when the cabinet is operated at the nominal set point velocities and without readjusting the fan speed control, a 50% increase in pressure drop across the new filter shall not decrease total air delivery more than 10%. Furthermore, to maintain air velocity ,blower/motor speed, have to be readjusted.Improper replacement of HEPA filters means replacing the original filter with a new one that may have different in resistance across the filters. This will lead to flow of incorrect amount of air flow and noisy alarms.

Results:

In RLQP, certification of biosafety cabinets is performed annually, but because of the limitation of NSF accredited field certifiers in Egypt,we certify the cabinets through a third party organization which don't have any accredited certifiers. After they made a certification of one of RLQP's cabinets, they recommended replacing the filter with a new one as there was an alarm. The new filter did not have the same resistance, so we had undesirable amount of air flow and unbalanced cabinet with potential impact on the tested product.

Recommendations:

Replacing HEPA filters of class II biological safety cabinets with a new one requires the latter to have the same resistance and achieve similar pressure drop across the filter with adequate flow of the air to ensure cabinet balance and product protection.