

Electrostatic Precipitator (EP) 0.01um or HEPA 0.3um can more effective for bacteria and virus remove?

REMOVE can be explained in here are “Kill” and “Trap”. “Kill” is easy be understand that the bacteria and virus are direct be killed that they can not survive and further harm for us, “Trap” is bacteria and virus be trapped / hold but not be killed, they are still survive and can reproduce, still may harm for us.

True HEPA filter can filter out (trap) particles including bacteria down to size $> 0.3\mu\text{m}$, bacteria and virus are still survive and hold on the filter surface, user need to replace the filter regularly e.g. once a year. During the replacement works, user must have a mask, protection cloth and must wash the hand after the works. Most of the virus size is smaller than $0.3\mu\text{m}$ (may down to $0.1\mu\text{m}$ or smaller) that HEPA can not really effective to remove. Most hospital still design HEPA is a must for their HVAC system for air purification purpose today because they need to ensure that their polluted air will continue to be purified if there is still a HEPA filter installed. Hospital may installed EP as a supporting purpose mainly despite they understand the bacteria and virus kill efficiency of EP is better than HEPA, the reason is EP needed electricity supply as power source and may need few cleaning times a year. They will concern the labour arrange and also may need to shut down the HVAC system during the cleaning period that may some difficulty to operate.

For an air purifier with EP design, the above difficulty may not be a concern now. User can clean up the EP chamber at any time, Electrostatic Precipitator (EP) is theory with high voltage normally up to $6,000\text{V} - 9,000\text{V}$, although the chamber with such high in voltage,

the electrical current (ampere) is always very low that make the whole system become safety during operation. Also, as a reliable air purifier machine that we can commonly bought on market must be safety approved and certified. Most common protection device including safety door lock and protection fuse etc... Also, for a machine with 100W power consumption, despite the user try to touch the internal part of the EP, then the user may just have a little bit “electric shock” feeling. (For ref: The “electric shock” feeling of our wearing cloth in winter something may up to $30,000\text{V}$, we will not be hurt because of the low current “ampere” created by our body motion / activity. Remember that “Electrostatic” is not equal to our home “City Electricity”. BUT, for bacteria and virus, such electrostatic power will sufficient to direct and immediate kill them all by “Carbonization”. Despite how strong, powerful or harmful of the bacteria and virus e.g. SARS or Avian Flu etc... bacteria normally structured from multiple cells and virus structured by single cell, their cell membrane (Protein) is very weak that easy be breakthrough and totally destroyed by electrostatic power.

