CLEAN AIR SERVICES

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What is a HEPA Filter?

"HEPA" stands for "High Efficiency Particulate Air".

HEPA filters were first developed in the 1940s to capture radioactive dust. The research for HEPA filters, originally called "absolute filters," was part of a U.S. government contract related to the Manhattan Project that developed the nuclear bomb. HEPA filters provide a very high level of filtration efficiency for the smallest as well as the largest particulate contaminants. HEPA filter must capture a minimum of 99.97% of contaminants at 0.3 microns in size.

The 0.3 micron benchmark is used in efficiency ratings, because it approximates the most difficult particle size for a filter to capture. HEPA filters are even more efficient in removing particles that are smaller than 0.3 microns and larger than 0.3 microns. The fact that a HEPA filter's removal efficiency increases as particle size decreases below 0.3 microns is counter intuitive. Over the years, HEPA filtration has become more commonplace. It is used in high-tech manufacturing and clean room applications such as pharmaceutical, photographic, computers, optical, healthcare, food processing and aerospace.

Poor indoor air quality in facilities can detract from the health and productivity of employees. Asthma — often triggered or aggravated by dust — is the No. 1 cause of chronic absenteeism. Using HEPA filters to combat indoor air quality problems. The filters, which capture particles through layering and brain-like folds or corrugations, keep dust from spreading throughout the indoor environment. In many uncontrolled and non-critical environments, the benefits of HEPA filtration are negated by particles entering the air from other sources, such as an open door or window.

All filter systems require ongoing maintenance or they will become "loaded," clogged and ineffective. A clogged filter does not filter properly, reducing the airflow. A clogged filter also makes the air system motors work harder. HEPA filters need to be replaced when loaded. How often they need replacement depends on the level of use, and pre-filter maintenance.

The Definition of "MERV" air filters.

"MERV" stands for "Minimum Efficiency Reporting Value".

The MERV rating on an air filter describes its efficiency as a means of reducing the level of 3 to 10 micron-sized particles in air which passes through the filter. Higher "MERV" means higher filter efficiency. The purpose of the MERV standard is to permit an "apples to apples" comparison of the filtering efficiency of various air filters. Air filter efficiency refers to the relative ability of a filter to remove particles of a given size or size range from air passing through the filter. If a filter were 100% efficient, none of the particles in a given size range would escape the filter. The MERV Efficiency Rating Scale ranges from 1 to 16, with 1 being the lowest efficiency and 16 describing the highest efficiency. The particle size range addressed by the MERV scale is 3 to 10 microns. A logical inference is that if an air filter is removing particles down to 3-10 microns, it is certainly also at least that efficient at removing larger sized particles.

What are typical air filter MERV values?

A very low-cost disposable fibre glass furnace filter may have a MERV rating of 1 to 4 - pretty low. A high efficiency high MERV pleated air filter in the MERV 13-16 range would be expected to remove smaller particles between 0.3u and 1.0u in size at about a 75% efficiency. But before getting too excited about 75% looking not as good at 99.97%, remember that in a heating or air conditioning system air is being re-circulated through the filter system. So if each pass is removing 75% of the particles we want to capture, over time the heating or air conditioning filter system will do a good job of removing a very large amount of airborne dust.

The Definition of A "HEPA" rated air filter (High Efficiency Particulate Air [Filter] or better put, High Efficiency Particulate Arresting [Filter]) has to meet more demanding US DOE standards than a high MERV air filters. A HEPA filter is required to remove at least 99.97% of airborne particles down to 0.3u in size (in diameter or in their longest dimension). Any filter, high MERV or HEPA, can be expected to filter out larger particles with efficiency above its rating.

Do you need to install a high MERV air filter or a HEPA filter on your air conditioner or heating system air handler?

A high MERV air filter is much less costly than a HEPA filter and can be more effective over time in a residential or office air conditioning or heating system, but there are two warnings that have to be considered:

Smaller airborne particles than those covered by the HEPA or MERV rating might be filtered out with still higher efficiency. Their smaller mass means they may "stick" to the filter surface well but some filters, such as the budget lowest-cost fibre glass furnace filters, will pass these small filters right through when they are new, but filter out more of them as the filter surface becomes clogged and dirty with debris (leaving smaller and smaller openings through which air must pass.

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